

PAGES

MISSING

The Canadian Engineer

WEEKLY

ESTABLISHED 1893

Vol. 18.

TORONTO, CANADA, FEBRUARY 18th, 1910.

No. 7

The Canadian Engineer

ESTABLISHED 1893.

Issued Weekly in the interests of the

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

Editor—E. A. James, B.A.Sc.
Business Manager—James J. Salmond

Present Terms of Subscription, payable in advance:

Canada and Great Britain:		United States and other Countries:	
One Year	\$3.00	One Year	\$3.50
Six Months	1.75	Six Months	2.00
Three Months	1.00	Three Months	1.25

Copies Antedating This Issue by Two Months or More, 25 Cents.
ADVERTISEMENT RATES ON APPLICATION.

HEAD OFFICE: 62 Church Street, and Court Street, Toronto, Ont.
Telephone, Main 7404 and 7405, branch exchange connecting all departments.

Montreal Office: B33, Board of Trade Building. T. C. Allum, Editorial Representative, Phone M. 1001.

Winnipeg Office: Room 315, Nanton Building. Phone 8142. G. W. Goodall, Business and Editorial Representative.

London Office: 225 Outer Temple, Strand, T. R. Clougher, Business and Editorial Representative. Telephone 527 Central.

Address all communications to the Company and not to individuals. Everything affecting the editorial department should be directed to the Editor.

NOTICE TO ADVERTISERS.

Changes of advertisement copy should reach the Head Office by 10 a.m. Monday preceding the date of publication, except the first issue of the month for which changes of copy should be received at least two weeks prior to publication date.

Printed at the Office of the Monetary Times Printing Co., Limited, Toronto, Canada.

TORONTO, CANADA, FEBRUARY 18th, 1910.

CONTENTS OF THIS ISSUE.

Editorials:	
Electrification of Trunk Lines	143
Highway Bridges	143
Sanitation in Construction Camps	144
Leading Articles:	
Effect of Electric Transmission	144
Construction of a Concrete Dam.....	144
Relation of the Surveyor and Engineer.....	149
Railway Statistics of Canada	150
Types of Highway Bridges	154
Problems in Applied Statics	158
Sanitary Review:	
Provincial Sanitary Legislation	147
Disinfection of Sewage and Filter Effluents.....	148
Railway Earnings	160
Engineering Societies	161
Railway Orders	165
Construction News	162
Market Conditions	165

THE ELECTRIFICATION OF TRUNK LINES.

Some years ago the city street car lines and the suburban lines connecting became entirely electric roads. Recently the suburban lines have reached out until to-day they connect city to city—becoming, in fact, trunk lines, and it is not now unusual for the application for charters to ask for privileges for electric roads at least two hundred miles in length.

From a physical and mechanical standpoint the electric traction can meet all the demands and requirements of railroad service. Whether electricity will replace steam traction or not is a commercial problem, a question of cost of haulage and service.

There are certain sections of steam roads that will be converted into electric roads, not because of the monetary returns to be secured, but because of the smoke and noise attending the shunting and sorting of trains in city yards and the difficulty of keeping tunnels free of gas.

Once the electric power is being used in yards and tunnels the work of connecting up these units will commence, and the road that can offer a smokeless engine on their passenger trains will secure the traffic.

The question of cost has been carefully considered, and, although the number of installations from which accurate returns may be secured are not large, yet it is conceded that the first cost of an electric road, or the cost of electrifying a steam road would be much heavier than the cost of the steam equipment. Operating expenses will usually be less in the case of electric roads for the same service, but the demand is for quicker and more frequent passenger service. This means lighter trains at more frequent intervals. For this kind of traffic the electric locomotive appears well suited, and it is, perhaps, along this line we may expect the greatest development in the immediate future.

TYPES OF HIGHWAY BRIDGES.

In this number we commence a series of articles, entitled "Types of Highway Bridges." The author gives his idea, well illustrated by text and photo, of the type and kind of bridge suitable for particular locations.

Bridges, at one period in our country's development, were considered only as means of crossing streams. To-day, it is necessary not only to design a bridge strong enough for the traffic, but it must also appeal to one's sense of the suitable, and better if it appeals to one's idea of beauty.

Country places are to-day planned with much care. Country roads are being improved both for traffic and appearance, and the design of highway bridges must be in keeping with this improvement.

These articles show what one county engineer has done in this regard.

SANITATION IN CONSTRUCTION CAMPS.

The increase in the number of typhoid cases in Toronto—and the suggested cause, the influx of people from fever-infested towns—suggest the necessity and advantage of great care in the camps along the line of great works, as railways, canals, and the opening up of mining camps.

In cold winter weather too often little care is exercised in connection with slops and refuse. All waste is thrown out on the snow, and until the warm spring days come no inconvenience is experienced. But with the spring an epidemic sometimes breaks out, and no matter what the disease it usually is carried to the nearby town. The construction camp employee is a wanderer. A few weeks' work, and then he moves to another camp, or back to the town, possibly carrying with him disease germs, which he may transmit to others.

Sanitary necessities should be provided for camps. Incinerators would prove a good investment for every large contractor for a healthy, comfortable camp means a busy, contented gang, doing more and better work than the nervous, shifting laborer of the unsanitary camp.

CANADIAN MINING INSTITUTE.

The twelfth annual meeting of the Canadian Mining Institute will be held in Toronto during the first week of March. This will be a very interesting convention, as prominent engineers from all parts of Canada and the United States will be present and many very valuable papers will be read.

EFFECT OF ELECTRICAL TRANSMISSION.

The statement is frequently made that water powers have increased in value since it became possible to transmit power electrically. Charles T. Main, mill engineer and architect, Boston, Mass., points out in a recent paper that to be correct the statement should be modified. Since the introduction of electrical transmission many water powers which were before unavailable and valueless have been developed and become of value, and many others will be in the future, but water powers which have been developed and the power used adjacent thereto have, as a rule, not increased in value.

To the generally applied methods of calculating the values of an ordinary water power there must be added one or two steps in the process when applied to the determination of the value of a remote water power which may be capable of development with electrical transmission to some market.

To the cost of the development must be added the cost of the electrical apparatus and pole line to a point where the power is to be used, and this is a large item of expense in long-distance transmission. Usually, also, there must be added to the cost of the physical part of the plant a considerable amount for right-of-way for pole line, legal expenses, and cost of financing the scheme.

To the running expenses must be added the fixed charges for the electrical apparatus and pole line, and the cost of running and maintaining the same.

A correction must also be made for the loss of power in transmission.

A comparison of the cost of producing and transmitting power can be made with the prices which can be obtained for this power to determine if the development has any value,

and whether the development is warranted or not. The price which can be obtained for the power depends largely upon the cost of producing power by steam, or in some other way, at the point of delivery.

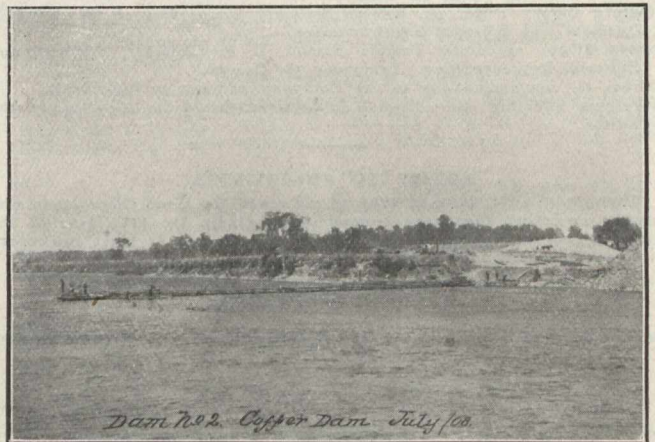
When used for lighting and railways the power is usually exceedingly variable, resulting in a low power factor. The conditions are so variable that it is generally useless to attempt to calculate the comparative cost of power produced by steam under such varying conditions. Each case must be worked out to meet the special conditions of the problem under consideration.

SOME NOTES IN CONNECTION WITH THE CONSTRUCTION OF A CONCRETE DAM ON THE TRENT CANAL.

J. B. Brophy, M.C.Soc.C.E.

In connection with the construction of Section No. 1, Ontario-Rice Lake Division of the Trent Canal, some very interesting and extensive works have been in progress during the seasons of 1908-9, not the least of these being Dam No. 2, situated on the River Trent, about 2½ miles north of its confluence with the waters of the Bay of Quinte, at Trenton.

This dam is quite a formidable piece of work, the total length from the back of the lock wall, on the east side of the

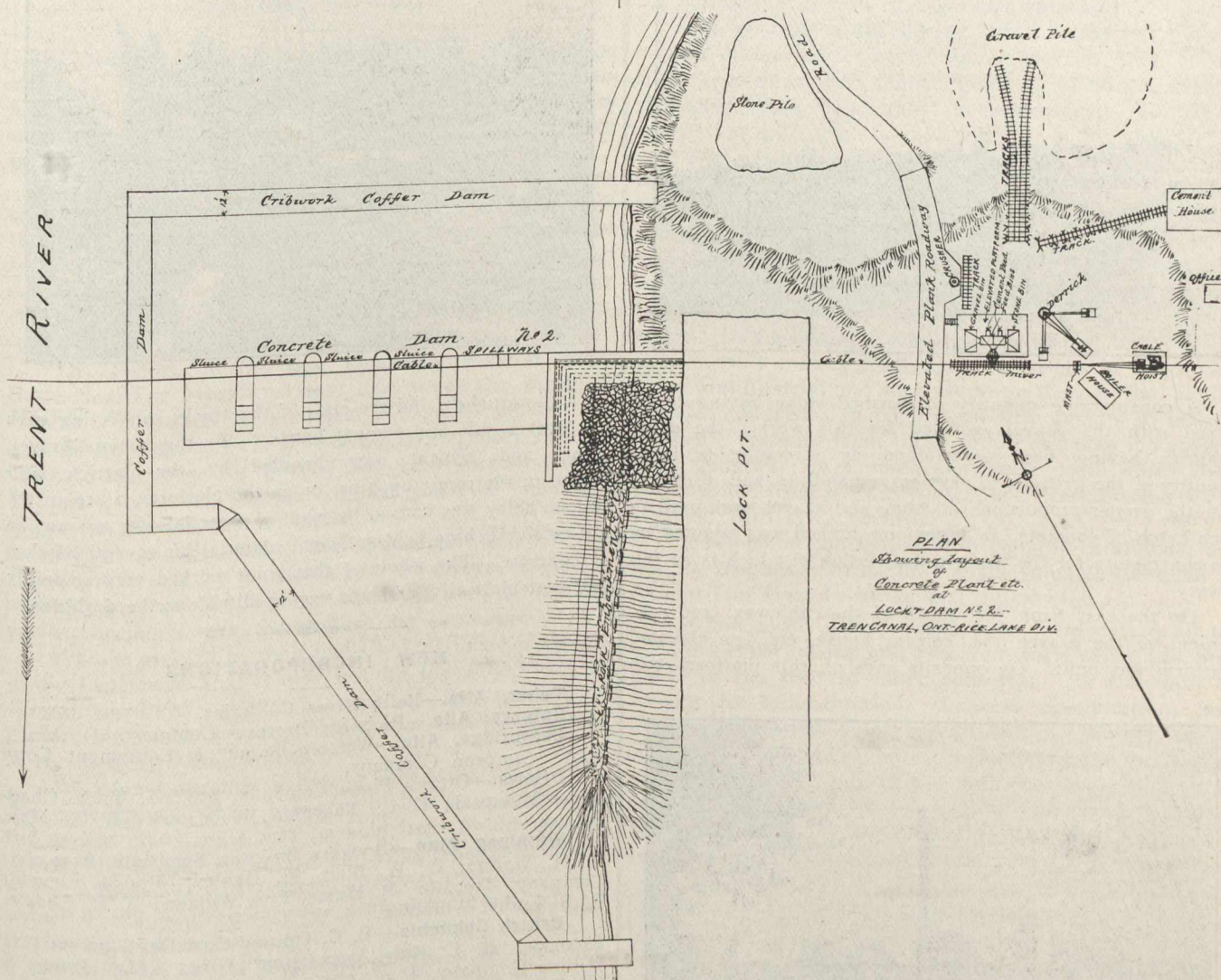


river, to the back of the west abutment being 520 feet. The east abutment consists of two massive walls of concrete,—the longitudinal wall extending from the lock wall westerly 65 feet. The transverse wall, forming the west face of the abutment, extends down stream 61 feet at the foundation level, gradually lessening, by steps, to 31 feet at coping level. These walls are 3 feet wide on top, gradually widening to 12 feet at foundation level. Adjoining the east abutment are two spillways divided by a small pier in the centre, each spillway having a clear opening of 20 feet. These spillways are of solid concrete, the height from foundation level to the top of the spillways (which is the regulated water level in the reach above the dam) averaging 32 feet. The width at the foundation level, including the apron, being 37 feet. There will be 11 piers dividing the balance of the dam into 11 sluiceways, each with a clear opening of 25 feet. Seven of these will have a depth of 12 feet, from the top of the stop-log sill to the regulated water level in the upper reach,—the remaining four sluices will have a depth of 9 feet. The depth, from the top of the stop-log sill of the first 4 sluices, to the foundation level, is 20 feet,—the other 7 averaging 17 feet, and the

width at foundation level, including apron, being 32 feet. The piers are 8 feet wide, 35 feet long, with an average height of from 28 to 34 feet from the foundation level to top of piers. The west abutment is of the ordinary rectangular form, a face wall and two wing walls, which will be extended well into the solid rock on the river bank.

Throughout the whole length of the dam, when completed, and in line with the stop-log openings, a trench 3 feet wide and 4 feet below the general level of foundations, will be excavated in the rock, to act as a cut-off for any leakage between the strata of limestone forming the bed of the river. A similar trench 2 feet deep, will extend from the face of the east abutment to the face of the west abutment, under the toe of the apron. These trenches form part of the foundations,

cribwork built in sections of about 15 feet in length by 12 feet wide, and filled with stone when in place,—the different sections being held in position, and together, by longitudinal timbers bolted to the ties. The outer face of the coffer dam was first sheeted with one inch boards over which was placed a covering of painted canvas, and over this a second sheeting of one-inch boards. In addition to this, a considerable quantity of cement in bags was used to stop leaks, especially on the upper face, where the pressure was greatest. This coffer dam enclosed an area of about 65,000 square feet, or nearly 1½ acres, and cost in the neighborhood of \$12,000. Concrete work was commenced on the 27th October, 1908, and finished about the middle of December,—the length of dam built was 270 feet, including the east abutment, two



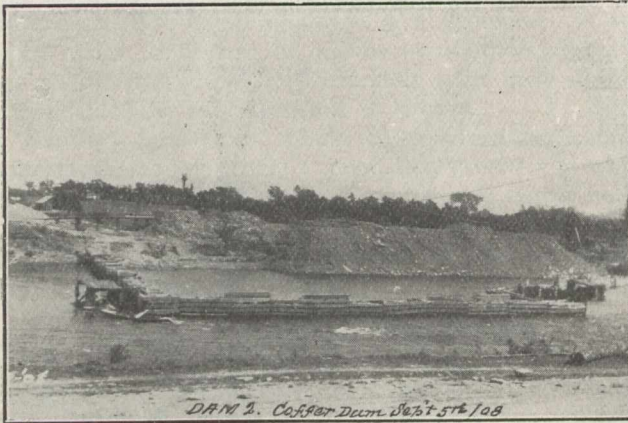
and have been put in on the portion of the dam now finished. The necessary coffer dam in connection with this work was a pretty serious problem, and it was decided to first enclose a sufficient area on the east side, to allow of the construction of about one-half the dam. Work on this coffer dam was begun on the 15th June, 1908, and it was not completed until about the end of September of that year, as great difficulty was experienced in getting a good foundation for the cribs, the bottom being very irregular and consisting of large deposits of gravel and boulders overlying the rock in places. Eventually, an auxiliary puddle dam had to be formed inside the main crib dam, before the water could be held in control. The main coffer dam was constructed of

spillways, four sluiceways, and four piers, the quantity of concrete in this portion of the dam being a little under 5,000 cubic yards.

Another important consideration was, the most economical and quickest method of conveying concrete from the mixer to the work, the mixer necessarily having to be placed on shore. Owing to the height of the dam, a trestle would be a very costly undertaking, and the distance the concrete would have to be carried in barrows or cars, would render this a slow and cumbersome method, so it was decided to install a cableway extending from shore to shore, and in line with the centre line of the dam. The natural ground surface on the west side of the river being some six feet be-

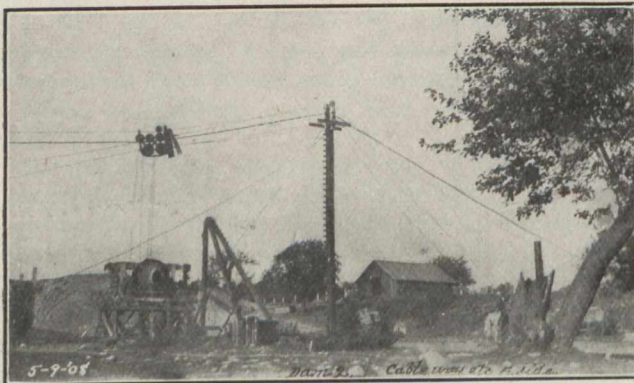
low the proposed top of dam, and the east bank about 8 feet below, very high masts to carry the cable where required in order to allow the buckets to clear the tops of piers when completed. The top of the east shore mast is 50 feet above the ground surface, and the west shore mast 48 feet,—the distance between them being 725 feet.

A 2-inch steel wire cable was used, and two single trap buckets of one cubic yard capacity, one bucket being filled at the mixer while the other was being run out to the work and back. A one cubic yard Smith mixer was used in connection with the cableway, and when everything was running smoothly, about 14 cubic yards per hour could be run out, the amount varying slightly with the length of the run, etc.



A considerable quantity of crushed stone having to be mixed with the gravel provided for this work, (the exact quantity having been ascertained by screening a large quantity of the gravel), to save extra handling and to ensure that the proper proportions of stone and gravel were used in each batch of concrete, an ingenious method was adopted by the contractors for the work, a description of which is as follows:—

On the east bank just north of the cableway, and convenient to the gravel pile, cement house, etc., an elevated platform was built. On opposite ends of this platform two



large triangular shaped bins were constructed, and immediately below, and connecting with the large bins by sheet iron doors, or traps, a smaller bin, divided into two compartments, was placed. These smaller bins were gauged to hold respectively, the quantity of stone, and gravel or sand, required for each batch of concrete, and at the top of each bin was an opening through which the necessary quantity of cement could be added. The small bins discharged directly into the mixer by means of sheet iron sliding doors in the bottom.

Just south of the platform directly under the cableway, a short length of track was laid, on which two flat trolleys were placed to receive the buckets and to run them under the mixer for loading. Along the west end of the elevated platform and about ten feet below it, an elevated plank roadway was constructed and a stone crusher erected underneath with its top, or feed, level with the roadway so that the stone could be hauled up and unloaded directly into the crusher, and as the stone was discharged from the crusher it dropped into a derrick box standing on a truck on a short length of track underneath. On the opposite side a large derrick was placed so that the radius of its boom intersected points at the



bins, the crusher, and the ends of two tracks connecting with the gravel, pile and cement house. By this means gravel, stone, and cement were handled by the derrick and placed in the receiving bins, or on the platform, as required, and no delay was caused by want of materials for mixing, as the receiving bins held sufficient material for several batches of concrete. The whole of this plant worked very smoothly and systematically, and was very creditable to the designer.

NEW INCORPORATIONS

Taber, Alta.—Belly River Collieries.

Calgary, Alta.—Richards Brothers Company.

Lethbridge, Alta.—Western Supply & Equipment Company. Simpson Company.

Ottawa.—Ottawa Piano Company, \$60,000; T. A. Chadburn, Montreal; E. C. Thornton, Woodstock; G. S. May, Ottawa.

Winnipeg, Man.—Rookery Building Syndicate, \$150,000; G. H. Walton, W. W. Blair, M. Hanlon. Prairie Elevator Company, \$100,000; R. Hume, Fort William; A. E. Choate, E. B. Eadie, Winnipeg.

British Columbia.—B. C. Oil and Coal Development Co., \$400,000. B. C. Rifle Association. Green Lake Mining & Milling Company, \$5,000,000. Hodgson Plumbing and Heating Company, \$25,000; Imperial Investment Company, \$25,000. J. C. Gibson Brokerage Company, \$25,000. Merritt Water, Light & Power Company, \$25,000. Olga Mines, \$1,000,000. Over-land Financiers, \$100,000.

Toronto.—Canada Slate Company, \$500,000; F. L. Hutchinson, A. N. Morgan, M. F. Pumaville, New Liskeard. Interlake Transit, \$100,000; E. S. Williams, T. A. Silverthorn, S. H. Bradford. Modern House Manufacturing Co., \$20,000; E. W. Nelles, J. L. Galloway, J. Cowan, jr. Atlas Mines, \$1,500,000; Misses G. B. Gilbank, M. Wilhelm, L. Walker. Willett Cobalt Mining Company, \$2,000,000; C. W. Mitchell, W. Kelly, J. A. Hopeson. Instantan Company, \$50,000; M. C. Cameron, J. H. Spence, D. D. McLeod. Diamond Rubber Company, \$10,000; T. Weigle, H. E. Eandress, Akron, O.; N. E. Oliver, Buffalo. Canadian Train Control, \$500,000. W. H. Allison, C. R. Allison, F. Saunders. Dominion Cannery, \$10,000,000; G. P. Grant, G. W. MacDougall, L. Macfarlane

THE Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND
WATER PURIFICATION

PROVINCIAL SANITARY LEGISLATION AND EXPERT ADVICE.

Since our issue of January 28th last, in which the leading features of the new Public Health Act (Saskatchewan) were explained with reference to sanitary engineering, we have had some correspondence from engineers upon the subject.

A doubt appears to exist in the minds of some engineers as to the effect this legislation may have upon their profession. It is feared in some quarters that the formation of a Government department providing expert sanitary advice may curtail somewhat the field for private consulting engineers.

This fear, we think, has no basis in fact.

Dr. Probst, in the last Quarterly Bulletin, Ohio State Board of Health, states: "At times the Board of Health is consulted by municipal authorities before they engage an engineer. It may send an engineer in such cases to look over the ground and give general advice. It insists, however, that an engineer must be finally engaged to prepare definite plans."

Dr. Probst also claims that municipalities have been saved great cost by the avoidance of errors, while the system has worked without friction, and, in fact, in perfect harmony with the engineering profession.

We are assured by the Chief Commissioner of Health of Saskatchewan that it will not be the object of the Bureau of Public Health to supplant the private engineer, but insist in every case that a capable engineer is retained by municipalities.

We cannot see that it can be otherwise, as the new Act provides that even before a by-law is submitted to the people plans must first be submitted to the Bureau of Health, giving a general and comprehensive outline of the scheme. It is, therefore, apparent that at the very outset it will be necessary for a municipality to engage the services of an engineer.

The duties of the engineering section of the new Bureau of Health in Saskatchewan will be on the same lines as those which have proved so effective in the past in the United States. Engineers all over the world owe a deep debt of gratitude to the efforts of such boards of health as those of Massachusetts, Ohio, New York, etc., and the central controlling authorities in Europe.

Throughout the whole of Canada, at the present time, there is a strong feeling that something must be done, and done immediately, to avert the pollution of streams by sewage.

This feeling we see manifested in a Bill lately introduced in the Senate providing for the prevention of sewage pollution to navigable waters and waters flowing into navigable waters; this apart from the provincial control which is being adopted in the Western Provinces, and which has partly been adopted in Ontario. In fact,

what is now happening in Canada is just a repetition of the sanitary evolution of the older countries.

The passing of legislative Acts necessitates the formation of authorities to administer such Acts. When such Acts carry with them legislation of an engineering character, then there must be engineering control in connection with such authorities.

The whole subject of the disposal of sewage with reference to its purification is practically new in Canada. We have an abundance of evidence of how the matter may be treated successfully in other countries. Most of the evidence, however, unfortunately applies to countries where the average temperature is much warmer than in Canada. The annual isotherm of 40 degrees Fahrenheit which passes through the thickly populated part of Canada only makes itself again apparent in lower Germany and Austria, and we have to go there to find similar climatic conditions in connection with results in sewage disposal. All data from these countries make it apparent that, generally, in Canada sewage disposal works must be protected from frost in winter, and even in some places supplied with artificial heat.

It is just in connection with climatic conditions, and how to overcome them, that much valuable data can be collected in Canada by central authorities.

It will avail little to waste time in repeating all the valuable experimental and research work which has been made in the past in older countries. All the data referring to sedimentation, chemical precipitation, land filtration, and biological treatment of sewage can be easily obtained and definite conclusions as to limitations arrived at. The study of the data, however, with reference to extremes of frost is still an open field, and must be boldly faced by the Canadian sanitary engineer if results of a satisfactory character are to be obtained.

Unfortunately, in Canada at present we have no complete sewage purification systems in our colder Western lands which any engineer can refer to for data. In fact, even in our warmer Provinces, with the exception of a few isolated cases, **sewage purification has not yet been attempted, and little data is forthcoming as to results in the cases which exist as to the effect of extreme frost on bacterial action.**

The formation of central sanitary authorities in Canada should be welcomed by every progressive sanitary engineer who is interested in the question of sewage disposal, and who wishes to see this branch of engineering put upon a sound and non-experimental basis.

The formation of central sanitary authorities can only be looked upon with jealousy by those non-progressive engineers, whose main endeavor lies in the retention of data and knowledge, and whose professionalism is restricted to obtaining dollars regardless of general efficiency.

THE DISINFECTION OF SEWAGE AND SEWAGE FILTER EFFLUENTS.*

By Earle Bernard Phelps.

Review by T. Aird Murray, C.E.

A report comprising 73 pages in Vol. V. of the journal published by the Massachusetts Institute of Technology, contains the most up-to-date information based upon experimental work on sewage disinfection.

On the subject of sterilization or disinfection, as it is better named, of sewage the American States are far in advance of the work done in Great Britain or Europe.

English engineers can turn to no experimental work of any consequence carried out in Great Britain, while the work done in Germany is only of a superficial character as compared with that of America. It is with surprise, indeed, that one finds no practical reference to sterilization in the reports on sewage disposal by the British Royal Commission; in fact, it is quite general to find prominent English sanitary experts talk of sterilization of sewage as some impracticable dream. Such pronouncements have been made only of late, at, and during, a time when American authorities were demonstrating that sewage effluents could be effectually disinfected at as low a cost as \$1 per 1,000,000 gallons of sewage.

Phelps has contributed valuable information to the history of sanitary science, and no modern work will rank superior in the amount of valuable data which he has collected and given out to the world than in the report under view.

The investigations upon which the report is based were conducted by E. B. Phelps at the sanitary research laboratory and sewage experiment station of the Massachusetts Institute of Technology, and in collaboration with Francis Daniels at the sewage disposal works, Red Bank, N.J., and Ezra B. Whittman, at the Walbrook Testing Plant at Baltimore, Md.

Sewage Purification.

The report commences by explaining what is generally meant by the term sewage purification. It is clearly shown that the modern term, "removal of putrescibility" does not include the total change of all organic matter to its mineral constituents; but only the removal of the tendency to putrify, and not the total oxidation of organic matter.

With the adoption of the percolating filter allowing from two to three million gallons of sewage to be treated per acre per day as against 10,000 gallons by land irrigation, it is pointed out that effluents of a very different character are now obtained. The later history of sewage development appears to lie in an endeavor to reduce the space required for the works, with one aim only, that of causing no apparent nuisance to the stream receiving the effluent, and with little or no attention to the disinfection of the effluent or removal of bacteria.

Nearly all the standard tests applied to sewage effluents contain no regulations as to bacterial removal. The fifth report of the Royal Commission, para. 322, recommends a standard for the guidance of local authorities. The standard takes into consideration only such factors which relate to the removal of the putrescibility and take no account whatever of bacterial removal.

Phelps holds, "It is reasonable, therefore, to inquire as to the fate of the sewage bacteria and particularly as to the pathogens, or disease producing microbes." This should be

*Published in contributions from the Sanitary Research Laboratory and Sewage Experiment Station, Vol. V.

apparent when the fact is considered that effluents from percolating filters contain more organic matter, only slightly oxidized, than effluents from land; and that the land has a power of retaining bacteria from the sewage not found in mechanical rough filters.

The report acknowledges that data with reference to the fate of the microbes are very conflicting. Rideal in his experiments with the Scott-Moncrieff filters is quoted, where he found reductions in *B. coli* ranging from 95 per cent. to 98.5 per cent. On the other hand, Alfred MacConkey's tests with *B. typhi* are also given where the microbes were found in two contact-bed effluents fifteen and seventeen days after inoculation.

Houston reports to the Royal Commission that percentage reductions of bacteria in sewage are of little importance, owing to the large number to commence with in the raw sewage. Phelps concludes that it must be assumed for sake of safety that the elimination of the typhoid bacillus is not materially greater than that of the other species and groups that may be studied.

Table 1 gives some interesting results of bacterial removal in 1904 at Boston. Raw sewage containing 5,430,000 bacteria per cubic centimeter showed reductions as follows: Septic effluent, 1,750,000 bacteria per cubic centimeter; contact filters, 1,000,000; trickling filters, 451,000; sand filters, 9,160. Here we see that even after sand filter treatment the effluent contains about 90 times more bacteria than is asked for by the German standard for filtered drinking water.

At La Madelein France, Calmette found 5,000,000 bacteria per cubic centimetre in crude sewage, 2,900,000 in a secondary-contact effluent, and 800,000 in the effluent from a trickling filter. The sewage contained 20,000, the contact effluent 4,000, and the trickling filter 2,000 colon bacilli.

An important experiment by Houston is given in connection with *B. pyocyaneus*, a pathogenic organism. Ten minutes after the bacilli were applied to the top of the filter they appeared in the effluent, and continued to be discharged for ten days. In a similar manner the same organism was found to pass through a septic tank and contact filter successively for nine days.

At Baltimore, Md., the board of advisory engineers concluded that 95 per cent. of the bacteria in the sewage could be removed by a system comprising a septic tank, 9-foot percolating filters, and supplementary sedimentation basins. With 20,000 *B. coli* in the sewage per cubic centimetre, this would leave, of course, 1,000 per cubic centimetre in the finished effluent. In sewage disposal without any attempt at disinfection, the above results must be looked upon as better than the average, and may only be maintained with difficulty in practice.

Phelps concludes, as follows:—

"From a consideration of the available evidence it may be stated in a general way that coarse-grained, rapid sewage filters remove a considerable proportion of the sewage bacteria; that such removal has not been found to be sufficiently complete in practice to have great sanitary significance; that bacteria of various groups and certain specific organisms pass through such filters in practically the same proportions as the bacteria as a whole; and that, in the absence of any information to the contrary, it should be assumed that such filters have no greater effect on the typhoid and other pathogenic organisms than on *B. coli*, *B. pyocyaneus*, sewage streptococci, or the different groups of sewage bacteria."

The Necessity for Disinfection.

Phelps in acknowledging that the removal of bacteria from sewage is not held at present to be an important factor

in sewage purification, predicts that it will probably do so in the near future.

Here it may be remarked, that engineers in laying out any system of sewage disposal, would be well advised to provide space for the eventual disinfection of sewage if ever required as he will see further on, this can easily be done at any time if space and levels will permit, and the operating expenses are not so great as was at one time thought.

Phelps points out the position taken up in Great Britain with reference to bacterial removal, which lays the onus of bacterial purification upon the community using the water and not on the community bacterially contaminating it. We think, however, much may be said in favor of the English position relative to this matter. Streams are liable to other sources of contamination apart from community sewage; and it is generally admitted, that apart from direct town sewage contamination, it is necessary to purify ordinary river water, passing through populated country, when used for domestic purposes. On the other hand, it is pointed out, "in the fight against infectious diseases, sound tactics demand an attack on the enemy as near as possible to the initial source of infection." The statement is made that the germs of typhoid should never be allowed to wander at large, and it is impossible to quarrel with such a conclusion, if practical preventive measures are at hand.

The great danger to the shell-fish industries, which is at present threatened, on account of sewage pollution and spread of typhoid from oyster and clam beds is pointed to. The demand for shell-fish in England has greatly decreased. Shell-fish areas are generally near large cities, and are, therefore, peculiarly subject to sewage infection. It certainly would appear that such industries can only be protected or saved in the future by the adoption of some method of sewage disinfection.

G. W. Fuller states that the annual crop of oysters and clams from the Atlantic and Gulf coasts exceeds \$15,000,000; one-half of this total production comes from New Jersey, Maryland, and Virginia, and the shell-fish are grown mainly in the waters of the Delaware and Chesapeake Bays, which receive the sewage of many large cities.

It appears that the question of the treatment of the Baltimore sewage had a material effect in leading up to the enquiries which have resulted in the report now under consideration.

The Board of Advisory Engineers at Baltimore recommended sewage treatment consisting not only of settlement of solids and the production of a non-putrescible effluent, but also supplementary treatment by sand filtration. The cost of complete works with 75,000,000 gallons of sewage per day was estimated at \$3,283,250, of which sum \$1,040,750 was for supplementary sand filtration, an increase of over 31 per cent. over the cost of producing a non-putrescible effluent. The cost of operating the plant was over 48 per cent. of the whole cost of the supplementary treatment. The advisory board held that to remove bacteria by disinfection in lieu of sand filtration was prohibitively expensive. No American data at the time existed as to the cost or efficiency of disinfection. "It was, therefore, desirable to learn just how effective disinfection processes could be made under conditions in America, how much they would cost, and what after-effects, objectionable or otherwise, might follow their introduction."

Methods of Disinfection.

Under this heading a classification is given of the various methods which have been from time to time used or experimented with in sterilization processes. The classification is

that adopted by Rideal, and Phelps is indebted to the same authority for many of the facts noted.

The different methods and substances are considered in the following order:—

- (1) Heat.
- (2) Lime.
- (3) Acids.
- (4) Ozone.
- (5) Chlorine and its compounds.
 - (a) Chlorine gas.
 - (b) Hypochlorites or oxychlorides.
 - (c) Electrolytic chlorine processes.
- (6) Copper and its compounds.
- (7) Miscellaneous.
 - (a) Permanganates.
 - (b) "Amines" process.
 - (c) Sodium benzoate and other organic compounds.

Twenty pages of the report are devoted to classifying all the existing important data with reference to the above processes. It is not proposed to go over the data. The main point is that Phelps concludes after exhausting all the data available that of all the above disinfectants investigated, chlorine compounds and copper salts alone appear to be applicable to the sewage problem; and, that further a detailed study of cost relative to results leaves little doubt as to the greater efficiency of chlorine as compared with copper.

Chlorine appears, however, to be better suited as a sewage disinfectant even if the cost of both chlorine and copper processes were equal. Copper precipitates the organic matter in sewage, while chlorine unites with it by oxidizing the organic matter and rendering it less putrescible.

Chlorine, it is pointed out, is to some extent a by-product in the form of bleaching powder, while copper is a staple, and its price is, therefore, likely to increase. Phelps concludes after a careful examination of the available data that, "chlorine compounds are to-day by far the most economical and the most efficient disinfectant available in sewage works."

The experimental investigations will be further reviewed.

(To be Continued.)

RELATION OF THE SURVEYOR AND THE ENGINEER.*

R. E. Young, D.L.S.

There is a good deal of similarity in many respects between the work of Civil Engineers and Surveyors. We use the same field instruments, many of the same field books, to some extent the same methods of computation, and in both professions work in the field forms a large part of the duties. Many Engineers are Dominion Land Surveyors—many Dominion Land Surveyors are Engineers, and some of our members are also members of this society. I think it would be almost correct to say that all Dominion Land Surveyors should belong to the Canadian Society of Civil Engineers.

In considering the engineering profession one cannot but be impressed with the extraordinary opportunities that have been opened out and are now awaiting engineers through the great prosperity which has been the good fortune of Canada to enjoy in recent years. One is perhaps most impressed with the expansion of the mining industry,

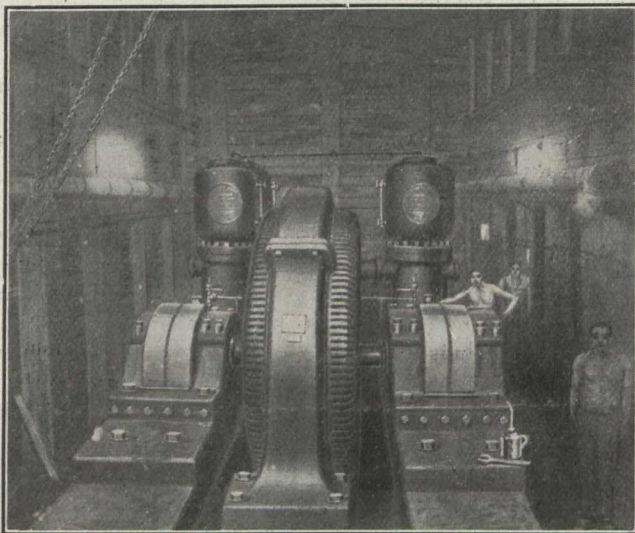
(Continued on page 153).

* Abridged from Mr. Young's address delivered at the Canadian Society of Civil Engineers dinner, Ottawa, in reply to the toast "Our Guests."

A LARGE ELECTRIC MINE PUMPING INSTALLATION FOR HANDLING HOT WATER.

In reopening the Ward shaft at Virginia City, Nev., a considerable flow of hot water was encountered, which for a time baffled the efforts of the workmen. The great depth of this shaft, 3,480 feet, and the high temperature of the water, 175 degrees, made the work of pumping out the impound quantity very difficult, but a temporary electric pumping outfit was finally successfully put into commission, and has since been supplanted by a permanent installation which easily handles the present continuous hot flow.

For emptying the mines, in the first place, a temporary motor-driven pump equipment was installed, by which compressed air driven sinker pumps at the bottom of the shaft lifted the water to a centrifugal pump on the 2,330 foot level. This in turn delivered to a vertical triplex pump on the 2,100 foot level. The sinker pumps were supplied with compressed air from two 100 horse-power Ingersoll-Sergeant compound air compressors driven by 100 horse-power Westinghouse motors located on the surface. The three stage Byron Jackson centrifugal pump on the intermediate level was belted to a 50 horse-power Westinghouse induction motor, while a 100



horse-power type "C" Westinghouse induction motor drove the 6 3/4 x 8-inch Knowles triplex pump at the uppermost pumping level.

This apparatus has since been replaced by the installation of the permanent pumping plant located in a pumping station 80 feet long, 24 feet wide and 20 feet high, connected with the shaft 3,100 feet below the surface. The permanent pumping equipment consists of a special slow speed, 800 horse-power Westinghouse type "HF" induction motor direct connected to a Knowles express type, duplex, double-acting pump, operated at 195 revolutions per minute.

The valves are of the automatic Poppett type arranged in nests of thirteen each, presenting a valve area of 104 square inches, which makes necessary very slight movement of the valves, and is conducive to a high speed and a minimum of wear. The valves and other visible parts are of bronze, and the pump has a capacity of delivering 1,600 gallons per minute against a total head of 1,550 feet.

The plant is equipped with a three-stage electrically-driven air compressor for charging the air receivers, besides a vacuum pump and an automatic oiling system. For convenience of erection and repair, the pump station will be fitted with a 15-ton travelling crane; in fact, it is intended to

include in this plant everything that will insure reliability and ease of operation.

The over-all dimensions of each pump are 27 feet 3 3/4 inches in length, 17 feet in width, and 14 feet 2 inches in height. The motor is 13 feet in diameter, and the steel crank shaft, forged from one piece, is 13 3/4 inches in diameter and 14 feet 4 1/2 inches long. The total cost complete for operation was about \$125,000. These pumps are supplied by either one of the two centrifugals located in the pump at the bottom of the shaft, and operated by special 75 horse-power Westinghouse motors on a vertical shaft.

The water is discharged through a 16-inch steel column with welded steel flanges. The thickness of this pipe varies from 3/4-inch at the tunnel level to 9-16 inch at the bottom. The column is supported by means of heavy weight iron clamps six inches in length, which in turn rest upon the wall and end plates. To resist the pressure of 675 pounds to the square inch, male and female flanges are used and each fitted with a lead-filled copper gasket.

The electric current is taken down the shaft at 2,240 volts over a three-conductor, lead-covered, steel-armoured cable of 400,000 circular mils capacity. The electrical equipment, from the automatic oil circuit breakers on the surface to the motors themselves, is the best that money can buy; and in operation, with the splendid Westinghouse plants of the Truckee River Electric Company behind it, results have been obtained never before approached for this class of work.

The accompanying illustration of the present permanent pump house, 3,100 feet underground, was retouched from an actual flashlight photograph obtained during a recent visit to the mine. The normal temperature of this pump room, 110 degrees Fahrenheit, is attested by the costume of the men, who work their daily shifts of twelve hours under these conditions.

RAILWAY STATISTICS OF CANADA

The returns of Mr. J. L. Payne, comptroller of statistics have been presented in a report by Mr. M. J. Butler, Deputy Minister of Railways and Canals. The report is for the year ending June 30th, 1909, and is made up from sworn returns furnished by the several railway companies and contains information of great value to engineers and officials of the transportation companies. The complete report will be very useful for reference purposes.

Steam Roads

During 1909, there were 24,104 miles in operation, being an increase of 1,138 miles over 1908.

The distribution of railway mileage, with the increase for the year, by provinces, is as follows:—

		Increase
Ontario	8,229.11	296.21
Quebec	3,662.94	89.29
Manitoba	3,205.30	94.39
Saskatchewan	2,631.34	550.04
Alberta	1,321.52	.....
British Columbia	1,795.94	63.11
New Brunswick	1,547.25	37.89
Nova Scotia	1,350.53	6.48
Prince Edward Island	269.33	1.83
Yukon	90.91	.....

It may be explained that in the province of Alberta considerable railway building has been in progress during the past two years, but it was all returned as being still under construction on June 30.

Of cognate importance is the increase in second track and yard and siding trackage. The facts are as follow:—

The net earnings of \$40,456,251.76 represented 3.09 per cent. on a capitalization of \$1,308,481,416.

Following is an analysis of the earnings from passenger service:—

	1908.		1909.	
	\$	cts.	\$	cts.
Passengers	39,992,503	11	39,073,488	84
Mails	1,670,120	90	1,723,180	97
Express	3,486,300	63	3,561,170	96
Other sources	1,705,234	33	924,485	50
Total	48,854,158	97	45,282,326	27

The gross earnings per mile of railway were \$6,017.93 as compared with \$6,397.21 in 1908.

The net earnings were \$1,678.40 per mile of line, a decrease from the preceding year of \$46.50.

The average revenue per passenger was \$1.195, representing a gain of .020 over 1908.

The average receipts per ton of freight were \$1.432, a falling off to the extent of .054 as against the preceding year.

The earnings per passenger train mile were \$1.150. In 1908 the average was \$1.228. The loss of .078 is accounted for by a decrease in the revenue from passenger train service, and an increase in the passenger train mileage.

The earnings per freight train mile were \$2.041. For 1908 the figures were \$2.008.

The earnings per train mile, for all trains, amounted to \$1.816, as against \$1.868 in 1908.

The earnings from all sources other than freight and passenger service were equal to 2.14 per cent. of the whole. The proportion of freight, passenger and other earnings to total earnings was as follows:—

	1907.	1908.	1909.
Freight service	64.73	63.81	66.65
Passenger service	31.16	31.89	31.21
All other	4.11	4.30	2.14

Operating Expenses

The operating expenses for 1909 amounted to \$104,600,084.43, a decrease, as compared with 1908, of \$2,704,058.08.

The proportion of operating expenses to gross earnings was 72.11. This was .93 less than in 1908.

The operating expenses represented \$4,339.53 per mile of line, as compared with \$4,672.30 in 1908.

The cost of running a train one mile in 1909, using the mileage of all trains as a basic factor, was \$1,309, a decrease of .055 as against 1908.

The following table gives the cost of running a train one mile:—

1900 .....	.864
1905	1.213
1908	1.364
1909	1.309

It will be observed that the cost of operation per train mile has increased 51.5 per cent. since 1900. On the other hand the earnings per train mile have increased but 41.7 per cent. within the same time.

Accidents

There were 478 persons killed and 1,404 injured by the railways of Canada in 1909. These figures represent an increase over 1908 of 29 in the number killed and a decrease of 943 in the number injured.

There were also 27 persons killed and 782 injured in railway service from causes other than the movement of trains, locomotives or cars. The final aggregate would therefore be 505 killed and 2,186 injured.

The accidents during 1908 and 1909 affected the following classes of persons:—

	Killed.		Injured.	
	1908.	1909.	1908.	1909.
Passengers	28	36	345	281
Employees	224	182	1,793	897
Trespassers	156	190	120	95
Non-trespassers	22	67	59	89
Postal clerks, expressmen, &c.	16	..	3	25
Other persons	3	3	27	17
Total	449	478	2,347	1,404

Of the 19,443 trainmen employed in 1909, one in every 172 was killed and one in every 28 injured.

By another standard of reckoning the hazard, it transpired that in 1909 one trainman was killed for every 737,831 miles trains were run, and one injured for every 120,310 miles. For the purposes of this calculation the mileage of trains, revenue and non-revenue, was used.

The accidents to employees from causes other than the movement of trains were distributed among the following classes:—Stationmen, 5 killed and 32 injured; shopmen, 5 killed and 269 injured; trackmen, 9 killed and 248 injured; other employees, 8 killed and 233 injured.

During 1909 there were 76 persons killed and 72 injured at highway crossings. The inquiry which was begun in 1908, as to relative number of accidents occurring at urban and rural crossings, was continued in 1909. Following is the result:—

	Killed.		Injured.	
	1908.	1909.	1908.	1909.
Highway Crossings.				
Urban	30	33	35	41
Rural	21	43	33	31
Total	51	76	68	72

In 1909 there were 1,767 unprotected urban crossings in the Dominion, and 15,426 unprotected rural crossings. Assuming that all the accidents took place at unprotected crossings, it will be seen that one person was killed for every 359 and one injured for every 497 of such rural intersections; while one person was killed for every 54, and one injured for every 43, unprotected urban crossings. The deduction suggested from these facts is that the hazard bears a more or less direct relationship to the extent to which any particular crossing is used.

It would appear to be an unwarranted assumption that so called protected crossings absolutely prevent loss of life or the infliction of injury, particularly at congested points in large centres. Out of 30 persons killed in 1908 at urban crossings, 10 lost their lives at protected intersections. In 1907 the number was 21. In 1909 the returns show 22. In other words, in 1909, of the 33 fatal accidents at urban crossings, 70 per cent. occurred at crossings having some form of protection. The accidents in such cases befall pedestrians who, in defiance of the lowered gates, seek to cross the tracks or pass under or over cars.

Highway Crossings

An effort was made last year, to obtain from the railways specific information with regard to the number of protected highway crossings in the Dominion. The word "guarded" was used, and in several instances it was misunderstood to include a crossing having cattleguards. The data collected was thus rendered valueless. For 1909, the inquiry was given three aspects: first, the number of protected highway crossings; second, how protected; and third whether the protected crossing was urban or rural as to location.

The returns were complete, and they disclosed the following facts:—

	Urban.	Rural.	Total.
Protected crossings	587	492	1,079
Unprotected crossings	1,767	15,426	17,193
Total	2,354	15,918	18,272

It will be seen that 3.09 per cent. of rural, and 24.93 of urban, crossings were protected. The term "urban" is here applied to cities and towns. Villages are classified as rural.

As to the means by which protection was afforded, the following summary gives the facts in that regard:—

How Protected.	Rural.	Urban.
By gates	34	133
By overhead bridges	190	110
By subways	213	166
By bells	39	77
By watchmen	16	101
Total	492	587

The inquiry as to highway crossings will be continued, and the information thus gathered will accurately show to what extent the menace from this source is being reduced by the adoption of protective measures.

RELATION OF THE SURVEYOR, ETC.

(Continued from page 149).

and which has been such as to command the attention of the world. We have only touched the fringe of our immense mineralized area, but we have a total of over \$130,000,000 realized from the mines of the Yukon in about twenty years; the \$20,000,000 which has been realized from the mines at Cobalt in the last five or six years; the developments at Sudbury, at which point the discovery of valuable mineral deposits was coincident with the construction of the Canadian Pacific Railway twenty-five years ago, and many other developments in mining, and I need not of course point out to you how much this great increase of wealth in Canada has meant to the profession of engineering. But, after all the main and abiding source of prosperity of any country is the development and proper utilization of its lands, and we in Canada can refer with much pride to this source of the prosperity of our country. If you would allow me I would like to read half a dozen lines from a recent article by Mr. James J. Hill, of St. Paul, an authority of world-wide repute on all such matters, in speaking of the importance of the land development of a country:

"It is made clear by every process of logic and by the proof of historic fact that the wealth of a nation, the character of its people, the quality and permanence of its institutions are all dependent upon a sound and sufficient agricultural foundation. Not armies or navies or commerce or diversity of manufacture or anything other than the farm is the anchor which will hold through the storms of time that sweep all else away."

We of the profession of surveying, we Dominion Land Surveyors, have been engaged during the last twenty or thirty years in converting into farms for use, by the limitation of land boundaries the fertile prairies of the prairie provinces—the three Western Provinces—those prairies which were described by the Hon. Clifford Sifton in his masterly address at the first meeting of the National Commission of Conservation, recently in Ottawa, as "the pride and the hope of Canada."

The mention of that Conservation meeting gives me occasion to say that in my humble judgment there was then inaugurated a work yet destined to occupy a very important place in the public mind in this country, and if you will allow me to do so, Mr. President, on this occasion, I would like to

say to the members of this society, Watch this Conservation movement, attach yourselves to it, help it along, grow up with it. In the collection and dissemination of information about the natural resources of this country and in the broader and larger view of Canadian citizenship, which its work should bring about for all Canadians, much benefit should result for the engineers.

I referred a few moments ago to the Hon. Mr. Sifton's characterization of our fertile prairies as the "pride and the hope of Canada." It was pointed out in this city a few days ago by the Hon. the Minister of Agriculture, that upon an area of 12,000,000 acres on these prairies last year there was raised an aggregate value of grain of \$195,000,000. He might have also said that to that immense sum about \$20,000,000 might be added for the results of the raising of cattle and the products of cattle. When I tell you gentlemen, that we Dominion Land Surveyors have surveyed a total area in that country of 145,000,000 acres, all agricultural land, mark you, and we hope to survey about 50,000,000 acres more, and when you consider that the area under cultivation was only 12,000,000 acres, it must open up to your minds when you reflect upon it, the enormous development which is to take place and which must mean more perhaps to the profession of engineering than to any other calling in Canada. Supposing that one were to imagine that for any reason it might be necessary to stop opening up new land in the West so that we could not develop one single acre more of prairie land than was placed under cultivation last year. Is not a country which can produce over \$200,000,000 annually from 12,000,000 acres of land, and we should be able to do at least that, indefinitely, a country which is going to enjoy great prosperity? We had an average of 21 or 22 bushels of wheat to the acre last year as compared with about 15 bushels in the United States, but the average in England is 33 bushels to the acre, and about 41 bushels in Scotland. Are we to say that our magnificent prairie lands, with the intelligent study with which we have a right to expect we Canadians can give to the question, and with the advantage in retention of soil fertility which our winter climate gives cannot reach the same maximum of production as in those older countries. If, as I have in these few words tried to picture to you, there is the reasonable certainty for the future of a high degree of prosperity for all Canada, based mainly upon the land wealth of our prairies, for I speak as a Dominion Land Surveyor, only of the lands in that part of Canada, does it not mean activity in railway construction, development of inland waterways, development of water-powers, and municipal undertakings of various kinds from the increased population. The figures I have given on our Western lands, on which I venture to express somewhat optimistic views as to the future for Canadians, and especially for engineers, are not mere rhetorical statements, for I speak with some sense of responsibility—these being matters as to which it is both my duty and privilege to be informed upon, and therefore Mr. President, may I not say with confidence to the members of this society—you may feel well pleased with the outlook before you.

Just this word in conclusion. Sir Thomas Shaughnessy, head of the Canadian Pacific Railway Company, a captain of over 80,000 men with over 5,000 miles of railway in the Western Provinces, and therefore so much better qualified than I am to speak on the subject, asked not long ago in a notable speech in Toronto: "Where is the man with the requisite temerity to make a forecast of the conditions in Manitoba, Saskatchewan, Alberta and British Columbia? I would not say in a quarter of a century—that would be too long—but in ten years."

TYPES OF HIGHWAY BRIDGES

F. Barber, A. M. Can. Soc. C. E.*

The problems of bridge engineering are gradually becoming recognized by those in authority as of sufficient importance, even in apparently simple cases, to warrant the retention of specialists in this work if the people's money is to be expended economically and effectively. Instances are only too numerous of insecure foundations and the gross and dangerous misuse of material in structures designed and built under the direction of those unacquainted with the distinctive problems of bridge construction. If immediate disaster does not attend misguided efforts of this kind, and the files of the technical press bear witness to the frequency with which it does, a very few years of service suffices to wear out the structure and render replacement necessary. The system of adopting a design from a number submitted by competing bridge companies without careful scrutiny by an experienced bridge engineer is scarcely less pernicious. Once freed of the restraint of a properly drawn and rigidly enforced specification, considerations of excellence in design and of graceful appearance are thrown to the winds in the efforts of competitors to underbid each other and secure the contract. An illustration of the evil effects of such a system is afforded by the absence of practically any improvement during the last fifteen years in the design or construction of Pony Warren Truss spans turned out by the average bridge company when not forced to conform closely to a good and complete specification and proper inspection in shop and field. The flimsy T-chord, rod laterals, excessively light sections in latticed hand-rails, corroded material, a large percentage of defective field rivets and poor materials and workmanship in painting are some of the consequences of entrusting the work entirely to the contracting bridge company without the check of adequate supervision by an engineer of experience in bridge design and construction. Fortunately this is being remedied by the growing disposition of municipalities to employ competent bridge engineers to prepare the designs and specifications, require proper inspection in shop and field, and give personal supervision to the work throughout its progress.

STEEL HIGHWAY BRIDGES.

THE UNIFORM EXCELLENCE of structural steel with the increasing price and poor quality of timber has resulted in the practical abandonment of the latter as a material for bridge construction except in parts of the country where timber is cheap and plentiful. In the more populous districts it is now no longer used for floors, steel stringers and reinforced concrete floor slabs having been found much more economical in the end on account of the frequent renewals necessitated by rapid wear and decay. Even in the sparsely settled regions of New Ontario, the use of timber floors in bridges built by the Provincial Government is regarded as a temporary expedient, provision being made in designing for the substitution of concrete floors when the traffic becomes heavy and timber becomes scarce and poor.

While great progress has been made toward permanent bridge construction by the extensive employment of steel, neither excellence of design nor the valuable properties of the material remove the necessity for care in fabrication and erection. Thorough inspection in shop and field by experienced inspectors is the only method of ensuring that the plans and specifications of the designing engineer are executed with absolute fidelity. Without it the temptation on the part of the contracting bridge company to unload corroded and pitted material upon the municipality is often too great, and steel which has suffered, through rusting in the stock piles, a loss greater than ten years of service would entail, frequently finds its way into the work. The laxity which makes this possible is likely to result in field painting of a character no better than that of the steel supplied. In all our work the necessity for rigid inspection is recognized, both during fabrication in the shops and erection at the bridge site.

As a result of inadequate inspection during construction and infrequent and careless painting while in service, it is difficult to predict the life of many steel bridges without careful examination by an expert. If properly designed, constructed and maintained, a steel bridge should last at least fifty years, but so little care has been exercised in connection with a great number of highway bridges that they cannot last half of that time. The careless or incompetent builder responsible for such structures will defend himself on the ground that fifteen or twenty years ago the art of bridge building was far less advanced than it is to-day. While this is true, it is no reason why bridges built at that time should not be in excellent condition now, for the famous Britannia and Conway tubular bridges, built sixty years ago, are in service to-day, and are carrying some of the heaviest railway traffic in the British Isles.

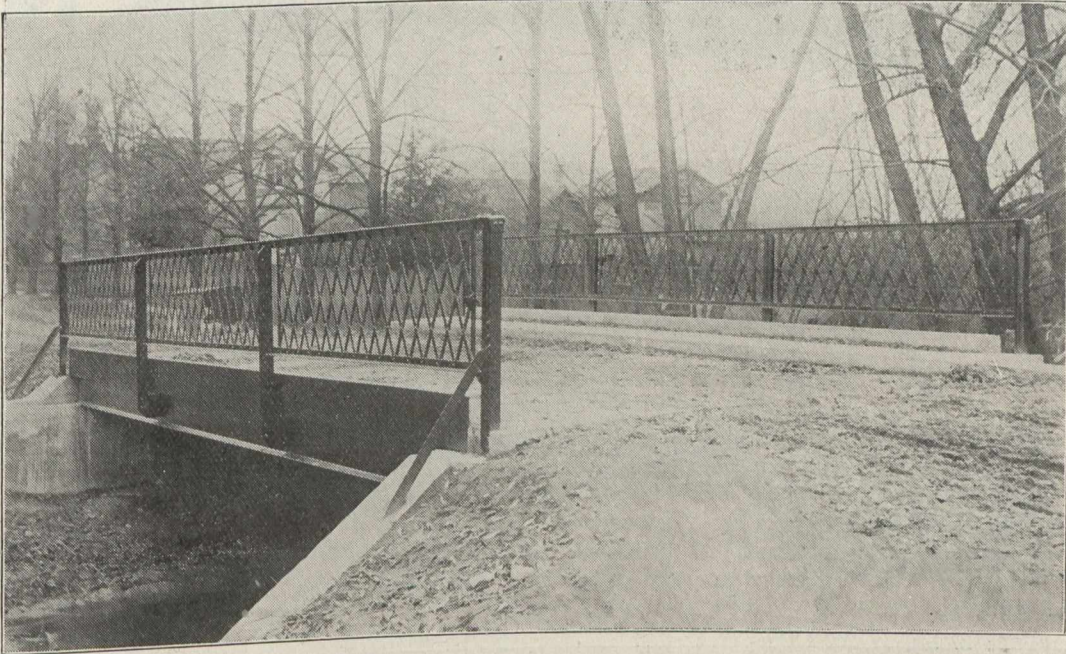
It is to be regretted that so little attention has been given in the past to the appearance of steel highway bridges in Canada. Frequently careful re-designing will greatly improve a structure from the aesthetic point of view at no increase in cost, and in very many cases the expenditure of a small additional amount in order to employ a curved top chord or to substitute a latticed hand-rail for one of gas pipe will result in a most gratifying improvement

*Engineer for the County of York, Ont.

of appearance. Fortunately, there is an increasing willingness on the part of municipal councils to approve of a slight additional expenditure for this purpose where the bridge is situated in a populous district on a much-travelled road.

SRIGLEY STREET BRIDGE, NEWMARKET, ONT.

STEEL BEAM BRIDGES, consisting of I-beams supported laterally by channel cross-braces, are economical up to spans of 35 feet. They are more permanent than steel truss spans, since the thickness of metal in the beams is greater than in many members of truss bridges, and on this account will not so quickly deteriorate by rust.



The bridge illustrated is on Srigley Street, Newmarket, and was designed for a 15-ton roller.

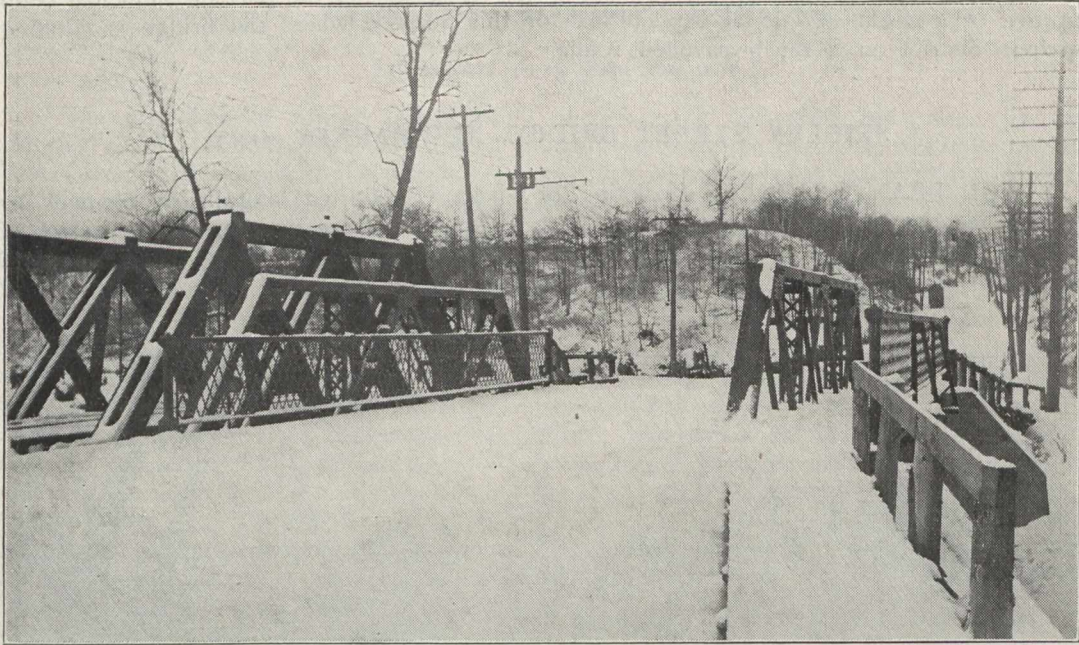
Span, 30 ft. clear.
 Roadway, 16 ft., with 4-ft. sidewalk.
 Floor, 6 in. reinforced concrete.
 Contractor, E. C. Lewis, Toronto.
 Cost of abutments and superstructure, \$1,511.

WESTON ROAD BRIDGE OVER BLACK CREEK, TOWNSHIP OF YORK.

PONY TRUSS BRIDGES, which are not high enough to permit of overhead lateral bracing, are used for short spans where there is not sufficient height above the water for deck structures. The best practice does not sanction the use of pony truss designs for spans over 90 feet on account of the difficulty of providing satisfactory lateral support to the top chord. This member should be of box section, that is, built up of two angles and a cover plate, or two channels and a cover plate in the form of a box with open bottom. The T-chord consisting merely of two angles placed back to back, although still used to a considerable extent in some places, is objectionable because of its lack of lateral stiffness.

The illustration shows a typical pony truss bridge, with box chords and latticed hand-rail.

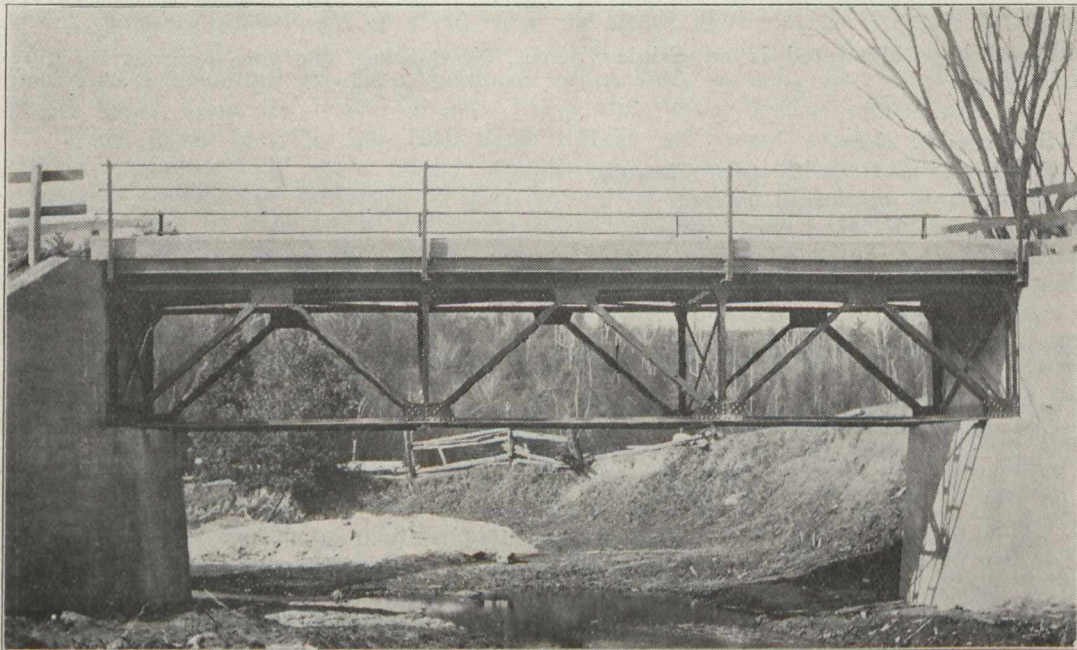
Span, 44 ft., centre to centre of bearings.
 Roadway, 20 ft., with 5-ft. sidewalk.
 Floor, 10 in. reinforced concrete and paving brick.
 Height of floor from low water, 13 ft.
 Cost of steel, \$1,787; cost of concrete abutments and floor, \$1,627.



Weston Road Bridge over Black Creek, Township of York.

BRIDGE OVER HIGHLAND CREEK, TOWNSHIP OF SCARBORO'.

DECK TRUSS BRIDGES, in which the trusses are underneath the floor, should always be used in preference to through spans where the height of the roadway above the stream will permit. By reason of the much smaller distance required between the trusses and between the bridge seats and the water, a considerable saving in both steel and abutment masonry is effected over the through type of structure. In ability to resist wind pressure and vibration deck spans are much superior to pony or low truss designs, which are necessarily without top lateral bracing.

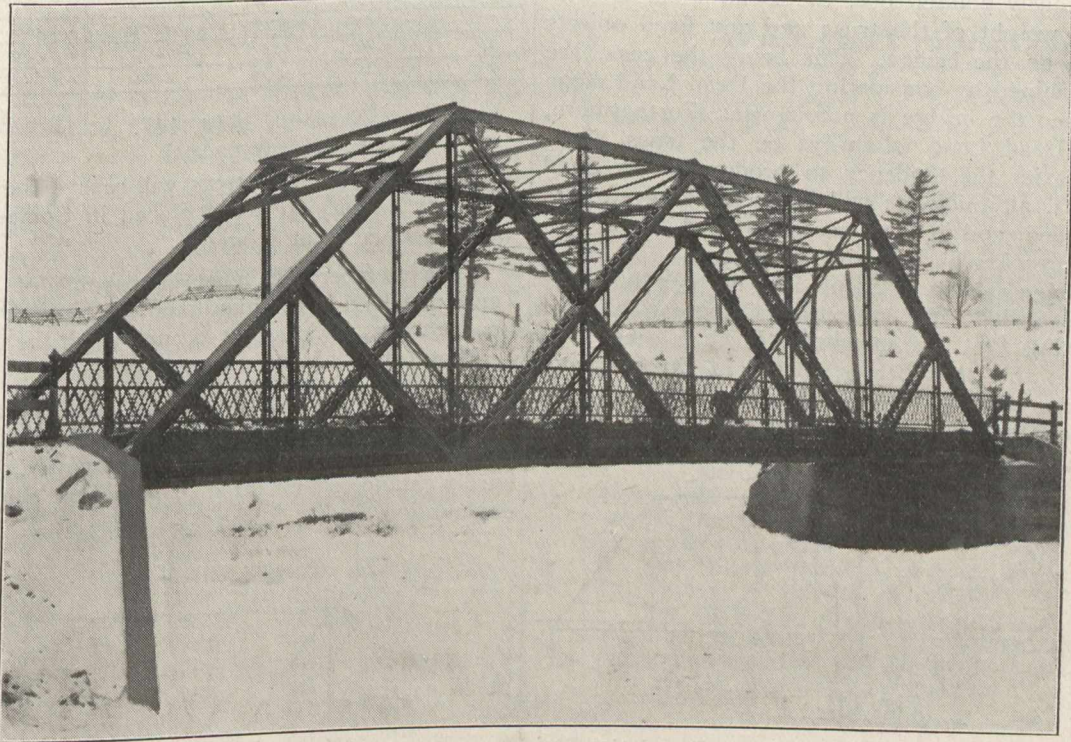


Some data relating to the typical deck span illustrated on the opposite page are given below:—

- Span, 42 ft., centre to centre of bearings.
- Height of roadway from ordinary low water, 17 ft. 6 in.
- Distance centre to centre of trusses, 10 ft.
- Floor, 6 in. reinforced concrete.
- Cost of abutments, superstructure and filling, \$2,857.

GRUBBE'S BRIDGE, TOWNSHIP OF ETOBICOKE.

THROUGH TRUSS BRIDGES differ from pony truss structures in being of sufficient depth to make the use of top lateral bracing possible, and, as already mentioned, supplant the latter type for spans of over 90 feet. The double-intersection Warren truss with eight panels employed for Grubbe's Bridge (illustrated opposite) possesses the advantage of requiring the same section from end to end of the bottom chord, and the same is true of the top chord. The cost of this bridge was considerably enhanced by the treacherous nature of the foundation-bed. Owing to the strong scouring effect of the rapid current upon the soft soil at this point and the tendency of the bank to creep towards the stream bed, unusually extensive piling of each abutment was required, in one case involving the use of a row of anchor piles in the rear, to which the abutment piles were connected by steel rods.



Span, 92 ft. 6 in., centre to centre of bearings.
 Width of roadway, 16 ft. clear.
 Height of floor above water, 12 ft. 8 in.
 Floor, 6 in. reinforced concrete.
 Cost of piling, abutments, steel superstructure and filling, \$6,593.

BRIDGE OVER HOLLAND RIVER, NEAR BRADFORD, SIMCOE COUNTY, ONT.

THE HOLLAND RIVER at this point is very sluggish, never rising above the level of Lake Simcoe, and is 14 feet deep and 200 feet wide. On one side hard pan lies nearly 70 feet below the surface of the water, and the intervening soil is much too soft to give proper lateral support to piles. For this reason, after the piles were all driven to refusal and capped, stone was placed inside and around the piling to the surface of the water. Upon these foundations the concrete was built.

A double-span Pratt truss bridge, with centre pier, was adopted as being somewhat cheaper than a single span. Here a centre pier could be built for about \$500 less than one for the Scarlett bridge, described on a subsequent page, on account of the smaller distance from water to bridge floor. Moreover, no harm to the centre pier was anticipated from undermining or ice on account of the nearly dead water.

Each span, 100 ft. centre to centre of bearings.
 Roadway, 16 ft. clear of hand-rails.
 Floor, concrete and paving brick.
 Contractors for substructure, Barrett & Scott, Lambton Mills, Ont.
 Contractors for superstructure, Dickson Bridge Works Co., Campbellford, Ont.
 Total cost, \$18,000.

(To be continued next week).

PROBLEMS IN APPLIED STATICS.

T. R. Loudon, B.A.Sc.

(Registered in Accordance with the Copyright Act.)

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.

The Dead and Live Load Stresses having been determined independently of one another, the combined effect of Dead and Live Load may now be examined.

As previously pointed out, the Dead Load is composed of the weight of the truss and any fixed objects that may be on the bridge. This being the case, the stresses determined by considering the Dead Load alone will exist when the bridge is not in use. Furthermore, because the Dead Load is always on the truss, there will always exist the tendency to produce these Dead Load Stresses, although, as will be seen, these stresses may be modified, and in some cases reversed, from Tension to Compression by the Live Load.

A plus sign before a value in Fig. 147 indicates Tension, a negative sign indicating Compression.

Considering first the member AB, it is seen from Fig. 147 that this member is always in Compression. The maximum combined stress due to Dead and Live Load is 15,000 pounds, given when the Live Load is over joint (2) (Fig. 141).

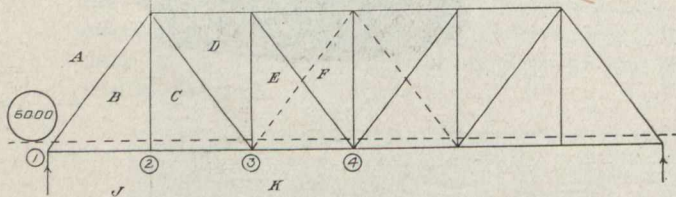


Fig. 141.

Consider the member DC. This member is in Tension 5,250 pounds, due to the Dead Load. The effect of the Live Load taking up a position at joint (2) is to destroy 1,250 pounds of the Dead Load Tension.

The Live Load alone at joints (3) and (4) places DC in Tension; that is, in either of these positions the Live Load augments the existing Tension due to Dead Load. It is evident that the maximum stress in DC is 10,250 pounds Tension, given when the Live Load is at joint (3).

Consider the member FE. The Dead Load places this member in Tension 1,750 pounds. The Live Load as it moves to joint (2) is seen to destroy 1,250 pounds of this Tension. Reaching joint (3), the Live Load not only destroys the existing Dead Load Tension, but is seen to place FE in Compression 750 pounds. However, a Tension member due to its slender proportions cannot take up Compression without "buckling." This being the case, provision must be made for this 750 pounds Compression, which would otherwise "buckle" FE.

The Counterbrace.

Let Fig. 148 represent the panel in which the member FE lies. In this diagram, the line joining A and B represents the member FE.

It has just been shown that when the Live Load reaches joint (3) (Fig. 141), the member FE would be subjected to 750 pounds Compression. This being the case, the condition of affairs may be represented by a

pair of equal forces, one acting at each extremity of FE at A and B as indicated in Fig. 148, these two forces tending to place FE in Compression.

Now, since FE cannot withstand Compression, the joints A and B will tend to move inward under the forces indicated. But when the joints A and B move inward, the joints D and C will move outward. A Tension member placed from D to C, as indicated by the dotted line, will prevent D and C from moving outward, and, in consequence, prevent A and B from moving inward. That is, a Tension member placed from D to C capable

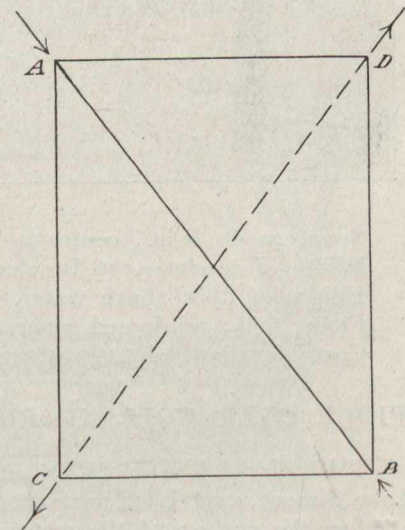
Member	Dead Load Stresses	2	Live Load at 3	4	Maximum Stresses
AB	-8750	-6250	-5000	-3750	-15000
DC	+5250	-1250	+5000	+3750	+10250
FE	+1750	-1250	-2500	+3750	+5500

Fig. 147.

of taking 750 pounds stress will relieve the member FE from any liability to being placed in Compression when the Live Load is at joint (3).

The member FE must be capable of taking 5,500 Tension, which is the maximum combined Dead and Live Load Stress. This stress occurs when the Live Load is at joint (4).

The above reasoning on the counterbrace, while of an almost self-evident nature, must be recognized by the reader as merely a popular explanation, which could hardly stand a scientific explanation without further explanation.



The reader can easily see that it would be impractical to place a small compression member alongside FE to take up the excess Compression when the Live Load is at joint (3). If, however, a diagonal member be placed from the remaining corners of the panel, it is evident that if FE be considered as not acting, and, therefore, left out of the problem, that this new diagonal member will be in Tension when the Live Load arrives at joint (3). To prove this statement, let the reader take out the member FE in Figs. 133 and 141 and replace it with a diagonal member placed from the other corners of the panel. If the Dead and Live Load stresses be determined for this new member and then combined, the member will be found in Tension 750 pounds.

RAILWAY EARNINGS AND STOCK QUOTATIONS

NAME OF COMPANY	Mileage Operated	Capital in Thousands	Par Value	RAILWAY EARNINGS.				STOCK QUOTATIONS TORONTO				
				Date from	Date to	1910	1909	Price Feb. 11 '09	Price Feb. 3 '10	Price Feb. 10 '10	Sales Week End Feb. 10	
								Jan. 1	Feb. 7	Feb. 14	Feb. 7	Feb. 10	Feb. 10
Canadian Pacific Railway...	10,048	\$150,000	\$100	Jan. 1	Feb. 7	\$7,445,000	\$5,846,000	175	175	179½	179½	404
Canadian Northern Railway...	3,180	225,000	100	"	Feb. 14	1,080,100	767,700	"	"	"	"	"
*Grand Trunk Railway	3,536	225,000	100	"	Feb. 7	4,202,661	3,247,946	"	"	"	"	"
T. & N. O.	264.74	(Gov. Road)	100	"	Jan. 21	90,514	46,417	"	"	"	"	"
†Montreal Street Railway...	141.79	18,000	100	"	Feb. 12	449,149	428,208	208	207½	223	222½	221
Toronto Street Railway...	114	8,000	100	"	Jan. 2	298,612	263,513	120	123½	122½	125	124
†Halifax Electric	13.3	1,400	100	"	Feb. 7	18,933	17,147	107½	107	127	123	124

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

GRAND TRUNK STATEMENT

Is Well Received in London Market, Although Some of the Third Preference Stockholders Were Disappointed.

The latest half-yearly statement of the Grand Trunk has been received with satisfaction on the London market. The gross receipts for the half year were £3,632,900; the net revenue, income, etc., £919,700, and the surplus £410,500. After payment of dividends a balance of £11,800 is carried forward. A sum of £255,000 sterling has been set aside towards the reduction of the engine, car renewal and expense account. The full dividend for the half year on the guaranteed 4 per cent stock, on the first preference issue, and on the second preference stock was paid. In 1908 only 2½ per cent. was paid on second preference. Some of the third preference shareholders had anticipated a dividend, but were disappointed.

The following is a record of dividends paid to Grand Trunk stockholders since 1890:—

Year to Dec. 31st.	Four % Guaranteed.	Five % 1st Pref.	Five % 2nd Pref.	Four % 3rd Pref.
1890	4	1 10-40	Nil	Nil
1891	3¾	Nil	Nil	Nil
1892	3¾	Nil	Nil	Nil
1893	2½	Nil	Nil	Nil
1894	Nil	Nil	Nil	Nil
1895	Nil	Nil	Nil	Nil
1896	Nil	Nil	Nil	Nil
1897	Nil	Nil	Nil	Nil
1898	4	3	3¼	Nil
1899	4	5	3	Nil
1900	4	5	4	Nil
1901	4	5	5	1
1902	4	5	5	2
1903	4	5	5	Nil
1904	4	5	5	2
1905	4	5	5	3
1906	4	5	5	3
1907	4	5	2½	Nil
1908	4	5	5	Nil
1909	4	5	5	Nil

The dividends declared for the six months ended June 30th found their way down only to the full five per cent. upon the first preference stock, the seconds and thirds receiving nothing. Just as the seconds then hoped for a partial distribution, so this time the thirds vainly hoped likewise. The third preference has been quoted at a figure in London, until recently at least, which seemed to discount a dividend.

In the following table are given earnings of United States roads reporting for January and the same roads for the two previous months, with the percentages of gains over last year:—

	Gross earnings 1910.	Gain.	Per cent.
January	\$32,897,189	\$3,917,461	13.5
December	34,532,499	1,242,022	3.7
November	38,767,144	4,544,847	13.3

WEEKLY EARNINGS

NAME OF COMPANY	Week Ending	TRAFFIC RETURNS		
		1910	Previous Week	1909
Canadian Pacific Railway.	Feb. 7	*\$1,438,000	*\$1,973,000	*\$1,135,000
Canadian Northern Railway..	Feb. 14	189,300	188,700	120,700
Grand Trunk Railway	Feb. 7	729,257	*1,008,257	120,700
T. & N. O.	Jan. 21	39,279	17,855	603,530
Montreal Street Railway	Feb. 12	72,589	78,837	12,423
Toronto Street Railway	"	76,141	74,035	70,004
Halifax Electric	Feb. 7	3,475	4,967	65,844
†London Street Railway....	"	18,003	.....	3,074

*Ten days—January 22nd to 31st.
 †For month of January—31 days.

C. P. R. EARNINGS

For December, 1909, the C.P.R. gross earnings were \$8,214,758; working expenses, \$5,099,335; net profits, \$3,115,423; for December, 1908, net profits were \$2,196,752, and for six months ended December 31, 1909, the figures are as follows: Gross earnings, \$49,925,511; working expenses, \$29,855,635; net profits, \$20,069,876.

For six months ended December 31st, 1908, there was a net profit of \$14,041,177. The increase in net profits over the same period last year is, therefore, for December, \$918,672; for the six months, \$6,028,699.

CALGARY STREET RAILWAY

The report of the Calgary Street Railway for the first six months of operation, i.e., the last six months of 1909, is very encouraging.

Passenger earnings were\$56,580.35
 Miscellaneous earnings 925.33

\$57,505.68

Operating expenses and general expenses 47,504.31
 Leaving a balance of earnings over expenses and interest of 10,001.37

MONTREAL STREET RAILWAY

Montreal Street Railway net earnings are improving, and for the three months ending December, 1909, the surplus shows an increase over last year of 16¼ per cent. The three months' net figures in detail are as follows:—

	1909.	1908.	Inc. P. C.
Pass. earnings	\$ 99,336	\$906,610	9.57
Mis. earnings	33,074	28,460	16.21
Total earnings	\$1,026,441	\$935,071	9.77
Oper. expenses	586,878	549,195	6.86
Net earnings	439,562	385,876	13.91
City percentage	39,665	33,946	16.85

CONSTRUCTION NEWS SECTION

Readers will confer a great favor by sending in news items from time to time. We are particularly eager to get notes regarding engineering work in hand and projected, contracts awarded, changes in staffs, etc.

Printed forms for the purpose will be furnished upon application.

TENDERS PENDING.

In addition to those in this issue.

Fuller information may be found in the issues of the Canadian Engineer referred to.

Place and Work.	Tenders close.	Issue of.	Page.
Winnipeg, Man., fence, gates.....	Feb. 28.	Jan. 21.	65
London, Ont., electrical apparatus...	Feb. 25.	Jan. 28.	91
Ottawa, Ont., wooden tank.....	Mar. 1.	Feb. 4.	40
Ottawa, Ont., piers	Feb. 28.	Feb. 4.	111
Toronto, Ont., cast iron pipe.....	Feb. 22.	Feb. 4.	40
Saskatoon, Sask., steel bridge.....	Feb. 21.	Feb. 4.	40
Moose Jaw, Sask., sprinklers.....	Feb. 21.	Feb. 4.	111
Calgary, Alta., pipe, valves	Feb. 25.	Feb. 11.	46
Toronto, Ont., steel and stone ...	Mar. 1.	Feb. 11.	46
Fort William, Ont., ties	Feb. 24.	Feb. 11.	136
Fort William, Ont., poles	Feb. 24.	Feb. 11.	136
South March, Ont., dredging	Mar. 1.	Feb. 11.	136
Winnipeg, Man., bridge	Mar. 7.	Feb. 11.	136
Winnipeg, Man., asphalt	Feb. 25.	Feb. 11.	136
Edmonton, Alta., bridge	Mar. 12.	Feb. 11.	136
Vancouver, B.C., pipe	Feb. 23.	Feb. 11.	136

TENDERS.

Moncton, N.B.—Tenders will be received up to Tuesday, March 15th, for the construction of a line of railway between George's River and Sydney Mines, N.S., a distance of 9.09 miles. Plans and specifications may be seen at the station-master's office at Sydney Mines, N.S., and at the chief engineer's office, Moncton, N.B. A. W. Campbell, Chairman Government Railways Managing Board, Ottawa, Ont.

Hull, Que.—Tenders addressed to John F. Boulton will be received up to Monday, 21st February, for the construction of an addition to the present corporation power house, Brewery Street. For plans, etc., see R. W. Farley, city engineer.

Montreal, Que.—The Amalgamated Asbestos Corporation, Ltd., is prepared to receive tenders for the removal of about 60,000 cubic yards of hard gravel and clay from the surface of one of their properties at Black Lake. Full specifications can be had at the company's office, Room 602, Eastern Townships Bank Building, 263 St. James St., Montreal. R. P. Doucet, secretary-treasurer.

Cobalt, Ont.—The Peterson Lake Silver Cobalt Mining Company, Ltd., call for tenders until February 25th for the enlarging of the present shaft on the island in Peterson Lake, midway between the shaft of the Union Pacific and that of the Susquehanna Mining Company, the rock excavation to be 12 feet by 6½ feet in the clear, and the deepening of the same by same dimensions to 150 ft., said shaft to be timbered in miner-like fashion with 10-inch x 10-inch timbers into two compartments 4½ feet by 4½ feet each in the clear, timber sets to be spaced six-foot centres and lagged with 2-inch lagging when necessary, and all of first-class workmanship to pass the inspection of the consulting engineer of the company. Tenders will be received separately for the widening of the present shaft, which is 33 feet deep, to the dimensions as described above, and a separate tender for the sinking of the balance of the shaft, and the timbering for the whole distance, as described. R. F. Segsworth, secretary-treasurer, 103 Bay Street, Toronto.

Hamilton, Ont.—Waterworks Department will shortly invite tenders for supplies, water meters, etc.

Kingston, Ont.—Tenders addressed to Alderman R. F. Elliott, Chairman of the Light, Heat & Power Committee, will be received up to February 22 for material required for

lighting plants of City of Kingston. C. C. Folger, general manager.

Kingston, Ont.—Tenders will be received up to 23rd February, for the delivery of Cement in Bags, Sand per cubic yard, and Crushed Limestone per cubic yard. Tenderers to quote prices delivered, and samples of sand and crushed limestone to accompany tender. J. W. Bradshaw, County Clerk of Frontenac.

Ottawa, Ont.—Tenders for improving approach to St. Gabriel locks will be received until Tuesday, 22nd February. Plans, etc., can be seen at the office of the chief engineer of the Department of Railways and Canals, Ottawa, and at the office of the superintending engineer of the Quebec Canals, No. 2 Place d'Armes, Montreal. L. K. Jones, secretary, Department of Railways and Canals.

Ottawa, Ont.—Tenders will be received up to Wednesday, 16th March, for the supply and delivery of British Columbia or "Douglas Fir" Dimension, required for the Rideau Canal, to be delivered by the 13th August. Specifications can be obtained at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa. L. K. Jones, Secretary, Department of Railways and Canals.

Orillia, Ont.—Tenders will be received until 8 p.m., Monday, March 7th, for Sewage Pumping Machinery, comprising gasoline engine, electric motors and centrifugal pumps. Plans and specifications may be seen at the office of the Chief Engineer, Mail & Empire Building, Toronto, or Resident Engineer's office, Orillia. W. C. Goffatt, Mayor; C. E. Grant, Town Clerk; Willis Chipman, C. E., Toronto.

St. Catharines, Ont.—Tenders will be received until February 21 for the erection of a public school building for school section No. 3, Niagara township. James Craise, secretary-treasurer, Niagara-on-the-Lake; A. E. Nicholson, architect, St. Catharines.

Toronto, Ont.—Tenders will be received until February 21st for oil switches required by the Electrical Department. G. R. Geary (Mayor), Chairman Board of Control; K. L. Aitken, electrical engineer.

Gilbert Plains, Man.—Tenders will be received until Saturday, February 19, for the erection of a six-room school building at Brickburn S.D., Gilbert Plains. Plans and specifications may be seen at the office of the secretary-treasurer, Gilbert Plains, or at the office of the architect, J. H. Bossons, Dauphin, Man.

Morris, Man.—Tenders will be received until Friday, February 25, by the rural municipality of Morris who propose to expend about \$8,000 on grading roads during the year 1910 and ask for tenders per cubic yard ditch measure. All tenders to include levelling of grades fit for traffic. The municipality will furnish one or two of the largest "New Era Graders" with disc ploughs in good working order. D. M. Ure, secretary-treasurer.

Winnipeg, Man.—Tenders for supply of railway asphalt plant, complete and tested for operation, will be received up to Tuesday, March 1. Col. H. N. Ruttan, city engineer, Winnipeg; M. Peterson, secretary, Board of Control.

Winnipeg, Man.—Tenders for supply of labor and materials for erection of pile trestle bridge over Omand's Creek, Portage Avenue, will be received up to Monday, February 21st. Plan and specifications from Col. H. N. Ruttan, City engineer; M. Peterson, secretary, Board of Control.

Moose Jaw, Sask.—Tenders will be received up to Monday, February 21st, for one 20 h.p. motor, with 11 x 10 pulley, bed plate, and dustproof bearings, suitable for operating a gyratory rock crusher. Angus Smith, City Engineer.

Prince Albert, Sask.—The Waterworks Committee recently decided to invite tenders for supplies.

Saskatoon, Sask.—Tenders will be received for the complete erection of a business block at Saskatoon. Plans and specifications may be seen at the Builders' Exchange, Winni-

peg, and at the office of the architect, W. W. LeChance, Saskatoon. J. D. Ferguson, Saskatoon.

Edmonton, Alta.—Tenders for telephone material will be received until Tuesday, March 1st, for the supply of the whole or any part of the required estimate of material. List of material, specifications and general instructions for shipment may be obtained on application to the superintendent of telephones office, Department of Public Works, Edmonton. John Stocks, Deputy Minister of Public Works.

Nanaimo, B.C.—Tenders will be received up to the end of February for the supply of vitrified clay sewer pipes required in connection with sewerage of the city. Specification and particulars may be obtained from Allan Waters, city engineer.

Vancouver, B.C.—The city council recently decided to invite tenders for the new incinerator for which a \$70,000 by-law was passed some time ago. W. A. Clement, city engineer.

CONTRACTS AWARDED.

Fredericton, N.B.—Hon. John Morrissy, chief commissioner of Public Works, has awarded the contract for the Starkey bridge, Parish of Johnston, Queens County, to Kenneth McLaggan, of St. Mary's. The contract price is in the vicinity of \$8,000.

Hamilton, Ont.—The Canada Cement Company just closed a contract to supply the city of Hamilton with cement for 1910.

Vancouver B.C.—Wallace Shipyards, of North Vancouver, have secured the contract for the construction of the new North Vancouver ferry, to cost in the neighborhood of \$130,000.

Vancouver, B.C.—Mr. Herbert W. Kent, the British Columbia representative of the Jens Orting-Boving Company, hydraulic engineers, London, Eng., has been awarded the contracts for his firm to supply and erect the 9,000 feet of pipe lines and specials for conveying the water from the dam to the powerhouse that is required by the Vancouver Island Power Company for its Jordan River plant on the southwest coast of the Island, at an estimated expenditure of more than \$80,000.

Vancouver, B.C.—George Ledingham was awarded a contract for laying ten miles of cement sidewalks at 12½ cents a square foot. This is half a cent higher than last year's rate. Other tenders were:—McEachern & Richardson, 13½ cents; D. G. McKenzie, 13½ cents, and 14 cents for walks over 6 feet wide; Palmer & Henning, 13½ cents. Tenders for three years' supply of crushed rock ranged from \$1.95 to \$3.05 a cubic yard, according to length of haul. The city's present contract with the Coast Quarries Company expires about July 1st, and is at \$1.75 a cubic yard.

Street paving tenders were as follows:—W. J. Sinnek, on granitoid blocks; \$2.90 per square yard for Beatty Street and \$2.80 on the other streets. Palmer Bros. & Henning; and \$2.55 to \$2.63 for cedar blocks; \$3.20 for granitoid and \$3.46 for bitulithic pavement with concrete base. M. P. Cotton, \$2.54 to \$2.74 for cedar blocks and \$2.79 for granitoid. T. R. Nickson & Co., \$2.72 to \$2.82 for cedar blocks. Hassam Paving Co., for Hassam pavement, \$2.40 to \$2.60. Warren Construction Company, for bitulithic paving, \$2.83 if concrete base is provided and \$2.58 without such base. The pavement tenders were referred to the city engineer for tabulation and will be considered again at the next meeting.

New York City.—The Harrison Engineering Company, have just closed a contract for heating the Hemming Manufacturing Company's plant at Garfield, N. J., and also for the heating of a school building at Boonville, N. Y. These buildings are to be heated by the Harrison System, which includes the air tube heater and a fan for distributing the air heated direct from the coal. In this system there is no steam apparatus, the air tube heater taking the place of boiler, coils, traps, etc.

FINANCING PUBLIC WORKS.

The following municipalities recently sold debentures:—

- Elmira, Ont.—\$5,000 waterworks.
- Etobicoke Township, Ont.—\$12,600.

Madoc, Ont.—\$6,000 local improvements.
London, Ont.—\$79,000 local improvements.
Saskatoon, Sask.—\$23,000 footbridge and local improvements.

Coderish, Ont.—\$15,000 waterworks and lighting plant, and \$5,078 local improvements.

Brockville, Ont.—Ratepayers will vote on a \$16,000 by-law for bridges.

New Liskeard, Ont.—H. Hartman, clerk, offers for sale debentures amounting to \$22,500.

Dunnville, Ont.—Two bonus by-laws were carried on February 14. One authorizes a loan of \$30,000 to the Canadian-American Gas & Gasoline Engine Company and the other provides \$10,000 to purchase a site and buildings for the Wilhelm Telephone Manufacturing Company.

Assiniboia, Man.—\$3,500 local improvement.

Neepawa, Man.—J. W. Bradley, secretary-treasurer, offers, until March 11th, debentures amounting to \$4,148.73.

Winnipeg, Man.—The Provincial Government propose to issue bonds for the construction of good roads within a 15-mile radius of the city.

Lethbridge, Alta.—The ratepayers will vote on a \$50,000 parks by-law.

Moose Jaw, Sask.—The council are considering the question of paving. Work estimated to cost from \$120,000 to \$160,000 is proposed, and debentures will be issued.

Camrose, Alta.—Until March 21st, O. B. Olson, secretary, offers \$8,000 debentures.

Red Deer, Alta.—A. T. Stephenson offers \$7,540 debentures for sale.

Vancouver, B.C.—Tenders are invited for the purchase of \$275,000 waterworks and \$75,000 road improvement debentures. G. Blight, C.M.C., Richmond Town Hall, Eburne, B.C.

RAILWAYS.

Ottawa, Ont.—Honorable G. P. Graham recently gave the following revised estimates of the cost of the Hudson Bay Railway by the alternative routes.

	Churchill.	Nelson.
Construction	\$11,351,520	\$8,981,000
Shops, etc.	7,757,152	7,440,000
Port expenses	6,675,000	5,065,000
Total	\$25,783,672	\$21,486,000

Edmonton, Alta.—The Yellowhead Coal Company, which is composed of Toronto capitalists, is seeking incorporation for a road to tap their rich field in the Yellowhead country.

Calgary, Alta.—Street railway extensions estimated to cost \$125,000 will be made by the Calgary Street Railway if arrangements can be made for "power."

Winnipeg, Man.—The remaining 50 miles of G.T.P. line from Balcarres to Regina, has been let to the J. D. McArthur Co., Winnipeg. The line is already finished from Melville to Balcarres. The balance of the Tofield-Calgary line, 135 miles has been let to the same company. Fifty miles of this line was let last year, and the balance now contracted for will complete the line to Calgary, forming a through connection between Edmonton and Calgary. The work is to be completed by October 31, 1910. The Tofield-Calgary branch will give the G.T.P. a short cut between Calgary and Edmonton.

SEWERAGE AND WATERWORKS.

Medicine Hat, Alta.—The council decided to spend over \$60,000 this season in extending the sewerage system and cement walks.

Vancouver, B.C.—Following are some of the items included by S. Maddison, Superintendent of the Waterworks, in an estimate of the expenditures to be made by his department:—Maintenance and submains, \$1,500; maintenance on Capilano, \$5,000; maintenance on Seymour, \$5,000; maintenance, city, \$20,000; new services, \$35,000; new meters, \$10,000; new hydrants, \$5,000; new hydrants with crane, \$2,500; shop and tools, \$4,000; telephone lines, \$500. Protection of work—Capilano, \$6,000; Seymour, \$3,000; total, \$110,700.

MISCELLANEOUS.

Montreal, Que.—It is reported that the Rea store is to be enlarged so as to take in the entire block surrounded by St. Catharine, University, Burnside and Union Avenue, at a cost in the neighbourhood of \$2,000,000. Building will commence in the spring.

PERSONAL.

Mr. Angus Smith, formerly city engineer of Regina, Sask., has been appointed city engineer of Moose Jaw, Sask.

Mr. R. F. W. Hagarty, B.A.Sc., Toronto University, (Engineering Department) Toronto, has been appointed secretary of the Canadian Cement and Concrete Association.

Mr. D. Pottinger has been appointed to the position of assistant chairman of the board of management of the government railways.

Honorable W. A. Buchanan has been appointed Minister of Municipalities by the Alberta Government. The new minister will assume responsibility for work handled previously by the Department of Public Works.

Mr. O. W. Smith, A.M., Can. Soc. C.E., formerly of Messrs. Galt & Smith, Toronto, has moved to Winnipeg, where he will take charge of large construction works for a contracting firm.

Mr. W. Hamilton has been appointed master mechanic of the western division of the G.T.R., with headquarters at Battle Creek, Mich., in place of Mr. E. D. Jamieson, assigned to other duties.

Mr. R. P. Fairbairn, C.E., succeeds Mr. A. W. Campbell as Deputy Minister of Public Works for Ontario. Following the promotion of Mr. Fairbairn, from engineer to Deputy Minister. Mr. A. J. B. Halfred, O.L.S., assistant engineer of the department and inspector of toll roads, is now acting as engineer.

SOCIETY NOTES.

Central Engineering Club, Toronto.—The regular monthly meeting of the above club was held on Tuesday, February 15th, when E. B. Gilmour, Superintendent Moulding Department, Canada Foundry, read a paper on the "Principles of Melting Iron in a Cupola."

A social evening will be tendered to members and friends next Friday evening, February 25th, at the St. Charles.

Engineers' Club, Toronto.—At the Engineers' Club last Thursday evening Mr. J. H. Shales lectured on "Some Elevator Troubles and How to Remedy Them." Mr. W. D. Black, of the School of Science, provided interesting lantern slides, and Professor Angus, the vice-chairman, presided.

Engineering Society, University of New Brunswick.—On Thursday evening, February 10th, Mr. Walter J. Francis, M. Can. Soc. C.E., consulting engineer, Montreal, gave an interesting illustrated lecture on the Quebec Bridge before the Engineering Society of the University of New Brunswick at Fredericton. There was a good attendance of members, as well as prominent local engineers and professional men.

Engineering Alumni Association, Toronto University.—At a dinner of the University of Toronto Engineering Alumni Association, held last Thursday evening, Mr. A. W. Campbell, Deputy Minister of Railways and Canals for Canada, emphasized the fact that there is great need in Canada to-day for skilled inspectors who will act as the connecting link between the designing engineer and the contractor who undertakes the construction of public works. Deplorable waste and extravagance was the result of municipalities engaging laymen, who were careless and pliable in the hands of a contractor. To the layman, the architect or engineer was apt to be a man of fanciful ideas, who could write long specifications and draw more or less intricate pictures. Towns and cities were frequent offenders in the matter of inspection, and the inferior results and failures in some municipal improvement works throughout the Province were due to the employment of untrained inspectors. The public were slow to grasp the value of expert services, and it was only through the blunders of unskilled men and costly experience that these matters would adjust themselves. Mr. Campbell said he was not speaking in the interests of the technically

trained men. As a public official, charged with the handling of public funds, he had reached those conclusions from years of experience, and deemed it but right that he should give the public the benefit of his experience, and warn them in the interest of good workmanship and economy. Some contractors, however honest, were chiefly concerned in the profits accruing, not the perfection and durability of the work, and it might be accepted as an axiom that the quality of the work could not be left wholly to the contractor.

Among those present were: E. Richards, president; K. A. Mackenzie, secretary; and Chas. E. Langley, W. R. Thomson, E. B. Merrill, W. B. Russell, Prof. H. E. T. Haultain, A. E. K. Bunnell, J. O. Roddick, H. Jones, Prof. Angus, Prof. Wright, J. Young, M. R. Riddell, W. D. Black.

The next meeting will be held early in March, when the question of scholarships for research work will be considered.

NEW INCORPORATIONS.

Sherbrooke, Que.—Fletcher Pulp & Lbr. Co., \$300,000; Charles H. Fletcher, R. A. Ewing, R. H. Fletcher. **Toronto.**—Charles Ciceri Co., \$100,000; C. N. Ciceri, J. B. Ciceri, C. Ciceri. Sterling Coal Co., \$3,500,000; S. Johnston, A. J. Thomson, R. R. Parmenter. Barber-Ellis, \$125,000; J. R. Barber, Georgetown; J. F. Ellis, Mrs. E. Ellis, Toronto. Rice, Green & Co., \$40,000; G. W. Close, P. Soligue, J. E. Robinson. Kemp Catering Co., \$40,000; E. O. Kemp, C. Blackmore, J. W. Payne, Alderson, Hammond & Ritchey, \$20,000; W. H. Alderson, H. K. Hammond, J. R. Ritchey. Wells & Gray, \$40,000; E. W. Wright, H. T. Hunter, J. M. Macdonnell. Radiant Electric Mfg. Co., \$40,000; T. B. Slocombe, G. H. Fairles, E. W. Drake. Canada Supply Co., \$150,000; L. Davis, G. E. McCann, C. E. Stonehouse. Merchants Press, \$40,000; R. B. Young, F. D. Patterson, J. T. Pillar. National Frame & Specialty Co., \$40,000; F. B. Duffet, E. A. Lockwood, W. Blackley. D. Robertson & Co., \$50,000; O. M. Moore, J. McBain, J. Hodgson. **Montreal.**—Commercial Magazine Co., \$50,000; J. M. Quinn, L. A. Tuillon, L. Garneau. Sawyer Company, \$100,000; B. Sawyer, Mrs. F. M. Sawyer, Miss B. Sawyer, Westmount. Canadian Dart Co., \$50,000; W. Dart, F. H. Jefferson, A. E. Cambridge. Desbarats Printing Co., \$50,000; E. Languedoc, C. G. Green-shields, R. E. Allan, G. N. Brooks Co., \$50,000; G. N. Brooks, H. F. Brooks, J. A. Patton. Kastels, \$49,000; M. A. Phelan, H. S. Williams, W. Bovey. Riordon Paper Company, \$6,000,000; G. W. MacDougall, L. Macfarlane, C. A. Pope. La-Lo Manufacturing Co., \$100,000; F. O. Stetson, Newton, W. Stetson, L. T. Mayo, Boston. C. A. Maish Co. of Canada, \$100,000; O. McMurtry, F. G. Bush, H. W. Jackson. Alice Mining Co., \$50,000; M. J. Matta, M. E. Deeb, G. C. Devault. Cinema, Limited, \$20,000; G. N. Ducharme, J. A. Hebert, L. Belair. **Indian Head, Sask.**—Sunny South Rural Telephone Co. Wide Awake Rural Telephone Co. Rose Valley Rural Telephone Co. **British Columbia.**—Birmingham Townsite Co., \$100,000. Call Creek Oyster Co., \$50,000. Canada Mines Co., \$100,000. Columbia River Orchards, \$20,000. International Electric Co., \$1,000,000. J. H. Brooks Co., \$150,000. Malkin Warehouses, \$300,000. Michigan Towing Co., \$25,000. National Paper Mills, \$250,000. Pioneer Lumber Co., \$75,000. W. H. Walsh Co., \$10,000. The British Columbia Gazette contains notice of the following new incorporations:—Vancouver Portland Canals, Limited, capital \$100,000. Prince Rupert Telephone Company, Ltd., capital \$25,000. Portland Canal Water & Power Co., Ltd., capital \$25,000. Main Reef Mining Co., Ltd., (non-personal liability), capital \$500,000. The Elko Water, Light & Power Co., Ltd., capital \$40,000. Canadian Northern Coal & Coke Co., Ltd., capital \$125,000. Robert S. Redfield & Co., of New York, manufacturers of chemicals, have been given extra-provincial registration.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

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

9177—January 8—Approving by law of the Rutland R.R. authorizing Clare Hartigan, G.P.A., Geo. Cassidy, G.F.A., to prepare and issue tariffs of tolls to be charged for the transportation of persons and property by the said company.

- 9178—January 8—Amending Order No. 8808, of September 30th, 1910, certifying plan, as accepted, of completed railway of C.N.R. in S.E. Quarter of Section 24, Tp. 43, R. 4, west 3rd Meridian, by striking out Range "4" and substituting "5" for the same.
- 9179—January 10—Approving road diversion by the G.T.P. Railway in Sec. 26, Tp. 28, R. 19, west 2nd Meridian, district of Saskatoon, Sask.
- 9180—January 8—Authorizing the Chatham Gas Company to lay gas pipe under G.T.R. at Lacroix Street crossing, Chatham, Ont.
- 9181 to 9184 Inc.—January 10—Authorizing the C.P.R. to construct its railway across public crossing at Station 846.40, mileage 16.3, Cowichan Branch at Station 825.00, mileage 15.6 Cowichan Branch; Station 42-75, mile 0.80; and Station 913.55, mileage 17.3, on Cowichan Branch.
- 9185—January 10—Approving by-law of the Alberta Railway & Irrigation Company appointing P. L. Naismith, general manager of the company, to prepare and issue tariff of tolls to be charged for all traffic carried.
- 9186—January 10—Authorizing C.N.O. Railway to construct its line and tracks, across public road between Lots 20 and 21, Concession 4, Hope Township, Ontario.
- 9187—January 7—Directing the G.N. Railway (operating the V. W. & Y. Railway) to forthwith publish and file joint rates on lumber and other articles covered by Joint Tariff of C.P.R., C.R.C., No. W. 847.
- 9188—January 8—Authorizing the C.P.R. to use and operate bridges Nos. 31.1 and 33.2 on its Nominating Section.
- 9189—January 8—Authorizing the C.P.R. to use and operate five bridges on its Nominating extension.
- 9190—January 8—Authorizing the C.N.O. Railway to construct proposed bridge over Bowman's Creek, Darlington Township, Durham County, Ontario.
- 9191—January 6—Directing the G.T.R. file, within 30 days from date of Order, plans of the location of gates at intersection of its Air Loop Line of railway with Hamilton and Port Dover Road in the Village of Jarvis, Ont.
- 9192 to 9198 Inc.—January 10—Authorizing the C.P.R. to construct its railway across and to divert public road at seven points on its Cowichan Lake Branch.
- 9199 to 9202 Inc.—January 8—Authorizing the Rural Municipality of Pipestone, Manitoba, to place wires across the track of the C.N.R. at four points in its municipality.
- 9203 and 9204—January 10—Authorizing the Bell Telephone Company to place its wires across the G.T.R. at 2¼ miles east Komoka Station, Ont., and the Essex Terminal Railway 2¾ miles west Lake Shore Station, on and McDougall Street, Windsor, Ont.
- 9205—January 10—Authorizing the Capital Rural Telephone Company to place its wires across the C.P.R. between Secs. 28 and 29, Tp. 17, R. 19, west 2nd Meridian, Sask.
- 9206—January 11—Approving revised location of C.P.R. Company's Cowichan Lake Branch, Station 0 to 952-45.3.
- 9207—January 7—Authorizing the Bell Telephone Company to place its wires across the tracks of the T. H. & B. Railway at public crossing on Beach Street, Hamilton, Ontario.
- 9208 to 9213 Inc.—January 8—Authorizing the Rural Municipality of Pipestone, Man., to place its wires across the track of the C.N.R. at six different points in said municipality.
- 9214 to 9224 Inc.—January 11—Authorizing the Manitoba Government Telephones to place its 'phone wires across the C.N.R. at ten points and the G.T.P. Railway at one point in the Province of Manitoba.
- 9225—January 11—Authorizing the Saraguay Electric & Water Company to place its wires across the Bell Telephone Company's wires ½ mile east of Toll Gate west of Pointe aux Trembles, P.Q.
- 9226—January 8—Refusing application of the Western Associated Press of Winnipeg, Man., for Order directing the C.P. Telephone Company and the G.N.W. Telephone Company to furnish it telegraph matter at tolls or rates established by them for delivery to and publication in one newspaper; rates established by the Board not later than February 1st, 1910.
- 9227—January 10—Authorizing the Hydro-Electric Power Commission of Ontario to place its conduit system under the M.C.R.R. at a point 287 feet south of the centre line of Murray Street, Stamford Township, Welland County, Ontario.
- 9228—January 11—Directing the G.T.R. to deepen existing culvert under its track at mile post No. 1, from Palmerston, Ont.
- 9229—January 10—Authorizing the C.P.R. to use and operate eight bridges on the N.B.S. Railway.
- 9230—January 10—Approving and sanctioning proposed location of the C.N.R. from mileage 0 to mileage 14 down to Fraser River from Yale, B.C.
- 9231—January 11—Authorizing the C.P.R. to construct extension across Timmins Street, North Bay, Ont.
- 9232 to 9235 Inc.—January 11—Authorizing the Bell Telephone Company to place its wires across the G.T.R. at four points near Hamilton, Ont.
- 9236—January 11—Authorizing the Seymour Power & Electric Company, Limited, to place its electric transmission line across track of the Central Ontario Railway, in Lot 14, Concession 7, Rawdon Township, Hastings County, Ont.
- 9237—January 4—Authorizing the Montreal Light and Power Company to place its wires across the C.N.Q. Railway and the Montreal Ter. Rail- way at intersection of Laurier Avenue, Tetreaultville, P.Q.
- 9238—January 11—Authorizing R. S. Hudson to place electric wire across the G.T.R. at Queenston Quarry Siding, Stamford Township, Ontario.
- 9239—Jan. 7—Refusing application of the C.N.O.R. for Order directing the Grand Trunk Railway and the C.P.R. within a specified time to file tariff from frontier American points to non-competitive points on line of the C.N.O. Railway in connection with passenger traffic from Pittsburgh, Pa., to Muskoka points.
- 9240—January 10—Amending Order No. 9026, dated December 20th, 1910, directing the T. H. & B. Railway to construct a highway bridge carrying the line of Garth Street, Hamilton, Ont., over the tracks of the Railway Company by providing that the corporation of the city of Hamilton be responsible for and pay the land damages, if any, caused by the raising of the grade at said highway.
- 9241—January 12—Recommending to the Governor-in-Council for sanction by-law of the Red Mountain Railway Company re expropriating in and around station premises on its line of railway.
- 9242—January 12—Recommending to the Governor-in-Council for sanction by-law of the Nelson & Fort Sheppard Railway Company re expropriating in and around station premises on its line of railway.
- 9243—January 10—Authorizing the C.N.O. Railway to construct sidings from main line of the G.T.R. to the right-of-way of its railway near point of crossing of said companies in Con. D, Scarboro Township, Ontario.
- 9244—January 12—Authorizing J. P. Edwards, of the Department of Public Works, of Ontario, to construct proposed overhead crossing of the Sault Ste. Marie Branch of the C.P.R. in Lot 5, Concession 1, Drury Township, Ontario.
- 9245—January 10—Authorizing the C.P.R. to construct industrial spur for Messrs. Byers & Anglin, Town of Outremont, P.Q.
- 9246—January 12—Amending Order No. 9031, directing the N. St. C. & T. Railway to restore joint rate of two cents per 100 lbs. on wood pulp in C. L., from Thorold, Ont., by extending the time within which said railway shall be required to restore said joint rate.
- 9247—January 12—Directing the G.T.R. to install electric bell at Wallace Avenue, Toronto, where it crosses tracks of said company.
- 9248 to 9250 Inc.—January 12—Authorizing the Bell Telephone Company to place its wires across the track of the P.M.R.R. at three points near Chatham Station, Ontario.
- 9251—January 12—Authorizing the Seymour Power & Electric Company, Limited, to place its wires across the wires of the Bell Telephone Company at village of Stirling, Ont.
- 9252—January 12—Authorizing the Bell Telephone Company to place its wires across the tracks of the C.P.R. at public crossing one mile north of London, Ont.
- 9253—January 12—Authorizing the Municipal Council of the Township of Maidstone, Ont., to place its telephone wires across C.P.R. at road on east side of Pike Creek, village of Elmstead, Ont.
- 9254—January 12—Authorizing the Bell Telephone Company to place its wires across C.P.R. at public crossing Waubeck Street, Parry Sound, Ont.
- 9255—January 13—Approving Crossings of the G.T.P. Railway, between Secs. 11 and 12, Tp. 28, R. 18, west 2nd Meridian, Dist. Saskatoon, Sask.
- 9256 and 9257—January 13—Approving crossings of the G.T.P. Railway between Sec. 19 and 24, Tp. 21, Range 3, west 2nd Meridian, Dist. of Yorkton, Sask., and between Sec. 1 and 2, Tp. 36, R. 11, west 3rd Meridian, Dist. Saskatoon, Sask.
- 9258—January 13—Authorizing the C.N.O. Railway to construct its lines and tracks across the public road between Lot 6 and the east half of Lot 7, Co. A, Hamilton Township, Northumberland County, Ont.
- 9259—January 12—Authorizing the Lindsay, Bobcaygeon & Pontypool Railway Company to cut off bank of N.W. Corner Ga'braith's Crossing, North Burkton Jct., Ont.
- 9260—January 5—Authorizing the T. H. & B. Railway to construct two branch lines for F. W. Bisc & Son, Hamilton, Ont.
- 9261—January 15—Authorizing the C.P.R. to reconstruct bridge No. 52-7 on the Cranbrook Section of its line of railway.
- 9262—January 17—Approving proposed layout of transfer tracks between the tracks of the C.N.O. Railway and the C.P.R. near Cypress St., Toronto, Ont.
- 9263—January 15—Authorizing the Manitoba Government Telephones to place its wires across the C.N.R. at public crossing ½ mile south of Clanwilliam Station, Man.
- 9264—January 15—Authorizing the C.P.R. to place its wires across the track of the Woodstock Section of its line at mileage 105.4, Dist. No. 2, Atlantic Div.
- 9265—January 6—Authorizing the C.N.Q. Railway to construct its lines and tracks across Charlesbourg Road, St. Roch-Parish, P.Q.
- 9266—January 4—Authorizing the C.N.O. Railway to construct its lines and tracks across G.T.R. near Powassan, Ont.
- 9267—January 4—Directing that the rate of speed at which the G.T.R., the K. & P., and the Bay of Quinte Railway Companies may operate their trains over the crossing of said railways in the city of Kingston, Ont.
- 9268—January 17—Approving proposed location of portion of the C.P.R. Company's Sedgewick to Ellerslie Branch, mileage 93.85 to 3.65.
- 9269—January 17—Approving bridges of G.T.R. across River St. Lawrence and the Soulanges Canal, Que.
- 9270—January 15—Authorizing the C.P.R. to construct branch line to the premises of the Peterboro Hardware Company, Limited, Peterboro, Ont.
- 9271—January 17—Authorizing the C.P.R. to make changes in interlocking plant at point of crossing with track of the G.T.R. at Komoka, Ont.
- 9272—January 17—Approving plan and profile of proposed layout of C.N.R. Company at Fort Garry, Winnipeg, Man., for passenger station and local freight yards.
- 9273—January 17—Directing the C.N.R. to improve condition of ditches along its right-of-way opposite Sec. 23, Tp. 2, R. 8, east, and Sec. 23, Tp. 2, R. 7, west, Manitoba.
- 9274—January 17—Authorizing the C.N.O. Railway to construct its lines and tracks across public road between Lots 2 and 3, Con. 5, Pickering Township, Ontario County, Ontario.
- 9275—January 17—Authorizing the C.N.O. Railway to construct its lines and tracks across public road between Lots 28 and 29, Concession 2, at Station 2830-67, Pickering Township, Ontario County, Ontario.
- 9276—January 17—Authorizing the C.N.O. Railway to construct its lines and tracks across public road between Lots 26 and 27, Concession 2, Station 2798-06, Pickering Township, Ontario.
- 9277—January 18—Authorizing the Saraguay Electric & Water Company to place its cable under track of the Montreal Terminal Railway at St. Pierre St., Pointe aux Trembles Parish, P.Q.
- 9278—January 18—Authorizing the Dominion Light, Heat & Power Company to place its wires across the Montreal Terminal Railway at intersection of Air Avenue, Maisonneuve, P.Q.
- 9279—January 18—Authorizing the C.N.O. Railway to cross with its tracks public road between Lots 8 and 9, Concession 4, Darlington Township, at Station 1492-00, Durham County, Ontario.
- 9300—January 18—Amending Order 8900, dated December 13th, 1909, approving plan No. B-1-354 of proposed subway to be constructed by C.P.R. where its railway intersects Alberta St., Regina, Sask., by striking out words, letters, and figures "Plan B-b-354" in first line of operative part and substituting therefore words and figures "Plans Nos. 40140 and 40513."
- 9301—January 18—Authorizing the C.N.O. Railway to construct its lines and tracks across public road between Lots 15 and 16, Concession 4, and Lot 17, Concession 4, at Station 2612-73, Pickering Township.
- 9302—January 17—Authorizing the C.P.R. to construct siding to premises of Standard Sanitary Manufacturing Company across Royce St., Toronto, Ont.

- 9303 to 9305 Inc.—Jan. 17—Authorizing the Seymour Power & Electric Co., Limited, to place its wires across the G.T.R. at three points in Hastings County, Ontario.
- 9306—January 18—Extending until 1st of May, 1910, the time within which the B. S. & H. B. Railway may construct, maintain, and operate branch line in city of Brandon, Manitoba.
- 9307 to 9310 Inc.—January 19—Authorizing the Berlin Light Commissioners to place its wires over, and gas mains under the track of the G.T.R. at four points in the city of Berlin, Ont.
- 9311 to 9320—January 19—Authorizing the Manitoba Government Telephones to place its wires across the tracks of the C.P.R. at ten points in the Province of Manitoba.
- 9321—January 19—Authorizing the C.N.O. Railway to construct its railway across public road between Lots 22 and 23, Concession 1, Scarborough Township, Ontario.
- 9322—January 19—Authorizing the C.P.R. to use and operate bridge No. 41.6 on the M. & O. Section of its line.
- 9323—January 19—Authorizing the C.P.R. to cross Water Street in the town of St. Andrews, N.B.
- 9324—January 19—Authorizing the corporation, city of Toronto, Ontario, to lay water pipe under track of the C.P.R. on Christie Street.
- 9325—January 17—Directing the widths of different farm crossings in Provinces of the Dominion, as follows:—Sixteen feet in the Provinces Manitoba, Saskatchewan, Alberta, and British Columbia; 15 feet, Province Ontario; 14 feet, Province Quebec and Maritime Provinces.
- 9326—January 18—Authorizing the Ontario and Minnesota Power Company, Limited, to divert, for use in United States, 6,000 of the electrical horse-power developed by it on the Canadian side of the Rainy River at or near Fort Frances, Rainy River District, Ont.
- 9327—January 20—Authorizing the G.T.R. and the C.P.R. to operate their trains over crossing where their lines cross east of Weston Road, Toronto Junction, Ontario.
- 9328—January 20—Authorizing the C.N.O. Railway to construct its lines and tracks across and to divert public road between Lots 33 and 34, Concession 1, Hamilton Township, Northumberland County, Ontario.
- 9329—January 20—Authorizing the C.N.O. Railway to construct bridge over creek at Station 1778-30, Lot 29, Concession 4, Darlington Township, Ont.
- 9330—January 20—Authorizing the C.N.O. Railway to construct its railway across public road between Lots 9 and 10, Concession A, Hamilton Township, Ont.
- 9331—January 20—Authorizing the C.N.Q. Railway to construct its line across Route Royale, Lot 192, Parish Pointe aux Trembles, mileage 25.13 west from Quebec Bridge, P.Q.
- 9332—January 20—Authorizing the C.N.Q. Railway to divert highway in village of Dombourg, Portneuf County, P.Q.
- 9333—January 20—Authorizing the C.N.Q. Railway to construct its lines and tracks across public road in village of Dombourg, P.Q.
- 9334—January 20—Authorizing the C.N.Q. Railway to construct its lines and tracks across public road on Lot 87, Pointe aux Trembles Parish, Portneuf County, mileage 24.52 west from Quebec Bridge, P.Q.
- 9335—January 20—Authorizing the C.N.Q. Railway to construct its lines and tracks across road to wharf on Lots 136, 154 and 162, Cap Sante, Portneuf County, P.Q.
- 9336—January 20—Authorizing the C.N.Q. Railway to construct its lines and tracks across public road at Station 1311-2, mileage 24.96 west from Quebec Bridge, P.Q.
- 9337—January 20—Authorizing the C.N.Q. Railway to construct its line and tracks across public road to wharf, in village of Dombourg, at mileage 24.89 west from Quebec Bridge, P.Q.
- 9338—January 20—Authorizing the C.N.O. Railway to construct bridge over creek at Station 1911, Lot 4, Concession 3, Whitby Township, Ontario County, Ontario.
- 9339 and 9345—January 18—Directing the G. N. Railway to construct four car spurs at Tamarack Station, British Columbia, for Messrs. Clarkson Bros., of Ymir, B.C., also at Porto Rico Station, B.C.
- 9340—January 18—Dismissing application, Col. Sam Hughes, M.P., for Order directing alteration in time tables of Canadian Pacific and Grand Trunk Railways, so as to allow persons reaching Peterboro on the latter company's morning train from Port Hope to catch C.P.R. Company's morning train for Montreal and Ottawa.
- 9341—January 20—Authorizing the Winnipeg Electric Railway Company to operate their cars and trains over crossing on Logan Avenue, Winnipeg.
- 9342—January 18—Directing the G.N.R. to establish on its V. V. & E., and N. W. & S. Railways re-arrangement of train service between Point Guichon and Vancouver; between Huntingdon and Cloverdale Junction, between Hazelmere and Cloverdale Junction, in the Province of British Columbia.
- 9343—January 22—Authorizing the C.P.R. and Canada Atlantic Railway to operate their trains over crossing at St. Polycarpe Junction, without being brought to a stop.
- 9344—January 21—Authorizing the G.T.R. to construct branch line on Anglesea Street, Goderich, Ont.
- 9346—January 21—Authorizing the municipality of the town of Macleod, Alta., to place its electric wires across C.P.R. at Third Ave.
- 9347—January 21—Authorizing the Mornington & Wellesley Telephone Association, to place its telephone line across C.P.R. at Tralee, Ont.
- 9348—January 22—Authorizing the Chinguacousy Municipal Telephone System to place its wires across the G.T.R. at 3rd Concession, west of Cheltenham, Ont.
- 9349—January 22—Authorizing the New Brunswick Telephone Company to place its wires across the C.P.R. at second crossing south of semaphore in Woodstock Yards, N.B.
- 9350—January 22—Authorizing the Manitoba Government Telephones to place its wires across the C.P.R. one-half mile east of Poplar Point Station, Man.
- 9351—January 22—Authorizing the G.T.R. to reconstruct bridge over Head's Creek, at Copetown, Ontario.
- 9352—January 22—Amending Order No. 8386, dated October 6th, 1909, authorizing the city of Winnipeg, Man., to place wires across the C.P.R. in Kildonan Parish, by substituting for plans approved under said Order plans Nos. E-5-B-90517, E-5-D-91122, and E-5-D-90517.
- 9353 to 9359 Inc.—January 22—Authorizing the Hydro-Electric Power Commission, of Ontario, to place its transmission wires across the G.T.R. at seven points in the Province of Ontario.
- 9360—January 24—Authorizing the G.T.R. to construct branch line to the premises of the Tudhope Carriage Company, Orillia, Ont.
- 9361—January 24—Authorizing the G.T.R. to construct branch line in Lots 2 and 3, Bexley Township, Victoria County, Ontario, to the Kirkfield Portland Cement Company, Limited.
- 9362—January 24—Directing that "asbestos" items be added to the Canadian Classification in the "Hardware List," excepting moulding pipe covering, packing, and rated as fifth class.
- 9363—January 24—Authorizing the G.T.R. to extend its public team track on Esplanade Street, between Sherbourne and Princess Streets, Toronto, Ont.
- 9364—January 24—Directing the C.N.R. to erect on each side of its right-of-way fences, in Oliver Township, Ontario.
- 9365—January 24—Authorizing the C.P.R. to use bridges Nos. 0.5, 0.9, 18.8, 19.1, 10.0, and 10.1, on the Ottawa Section of its line.
- 9366—January 24—Authorizing the C.P.R. to use bridge No. 44.8, Montreal terminals.
- 9367—January 24—Authorizing the C.P.R. to place its wires across the St. Stephen Branch of its line at mileage 33.58.
- 9368 to 9371 Inc.—January 24—Authorizing the Hydro-Electric Commission of Ontario, to place its wires across the C.P.R. at four points in Ontario.
- 9372—January 21—Dismissing application of the Hazeldean Rural Telephone Company for Order directing the Bell Telephone Company to provide and furnish better connection with its system at a point near Ottawa, Ont.
- 9373 and 9374—January 25—Authorizing the Manitoba Government Telephones to place its wires across the C.P.R. at points near Brandon, and Rapid City, Man.
- 9375—January 24—Authorizing the Saraguay Electric & Water Company to place its cable under track of the C.N.Q. Railway at Rue St. Pierre, Tetreauville, Pointe aux Trembles Parish, P.Q.
- 9376—January 24—Authorizing the Bell Telephone Company to place its wires across T. H. & B. Railway at public crossing, Primrose Avenue, and Back Street, Hamilton, Ont.
- 9377—January 24—Authorizing the C.N.O. Railway to construct a Y across public concession, in Neelon Township, Nipissing District, Ont.
- 9378—January 25—Authorizing the C.P.R. to use and operate bridge No. 25.86 on its North Bay section.
- 9379—January 25—Rescinding Order No. 9297, dated January 18th, 1910, authorizing the Saraguay Electric & Water Company to place its cable under Montreal Terminal Railway at Rue St. Pierre, Pointe aux Trembles, P.Q.
- 9380—January 25—Authorizing the C.N.Q. Railway to open for the carriage of traffic the Montmorency Branch of its line.
- 9381 and 9382—January 25—Authorizing the Hamilton Cataract Power, Light & Traction Co., Limited, to place its power lines across T. H. & B. Railway at Cainsville, Ont., and at Lot 34, Concession 4, Saltfleet Township, Ontario.
- 9383—January 25—Authorizing the Canadian Machine Telephone Company, Limited, to place its wires across the G.T.R. at the 9th Concession, Burford Township, Brant County, Ont.
- 9384—January 24—Authorizing the Bell Telephone Company to place its aerial wires across the telegraph wires of the Bell Telephone Company at public highway crossing 1½ miles east of Hammond, Ont.
- 9385—January 25—Authorizing the G.T.R. to construct several spurs in or near Midland, Ontario.
- 9386—January 20—Approving and sanctioning location of the C.N.R. from mileage 0 to mileage 14, Cranberry Lake south to Albreeda Summit, B.C.
- 9387—January 26—Authorizing the G.T.R. to construct branch lines on Lot 21 in 3rd Concession of Tay Township, Simcoe County, Ont., to premises of Manley Chew.
- 9388—January 26—Authorizing the G.T.R. to construct branch line to the premises of the Dunlop Tire Company, Limited, Toronto, Ont.
- 9389—January 26—Authorizing the G.T.R. to construct branch line of railway to the premises of the Muskoka Lake Lumber Company Limited, Muskoka Township, Muskoka District, Ontario.
- 9390—January 25—Amending Order No. 8769, dated September 2nd, 1909, authorizing the Canadian Atlantic Railway to construct siding from its track south of Sappers' Bridge, to the site of the Hotel "Chateau Laurier," by striking out clause re flagman, dispensing with services.
- 9391 & 9392—Jan. 27—Authorizing the Hydro-Electric Power Commission of Ontario to place its phone and relay wires over the C.P.R. in Townships of Ancaster and Gainsboro, Ont.
- 9393—January 28—Authorizing C.P.R. to construct two additional tracks across road allowance between Sections 24 and 25, Tp. 24, west and Meridian, Sask.
- 9394—January 26—Authorizing the Hydro-Electric Power Commission of Ontario, to place its wires across the P.M.R.R. at Lot 3, Con. R., S.E.R., Yarmouth Township, Elgin County, Ontario.
- 9395—January 29—Authorizing the Bell Telephone Company to place its wires across the G.T.R. at private crossing ½ mile east of Walkerville Station, Ontario.
- 9396—January 26—Approving overhead crossing over the C.P.R. at 6th Ave., Moose Jaw, Sask.
- 9397—January 29—Authorizing the C.P.R. to use and operate bridges Nos. 6.0 and 11.5 on the Georgian Bay and Seaboard Railway.
- 9398—January 29—Authorizing the G.T.R. to construct branch line near Sherks Station, Humberstone Township, Welland County, Ontario.
- 9399—January 29—Authorizing the C.P.R. to construct industrial spur across 24th Street, Saskatoon, Sask.
- 9400—January 29—Approving plan of fifty-foot span on C.N.O.R. on the Toronto-Ottawa Line, over Greenwood Creek, at Station 2551.
- 9401—January 27—Approving and sanctioning location of C.N.R., mileage 15 to mileage 24.7, up the Fraser River from Yale, B.C.
- 9402—January 31—Authorizing the C.N.Q. Railway to divert public road on Lots 415, 16 and 17, Parish St. Augustine, mileage 19.60 west from Quebec Bridge.
- 9403—January 27—Authorizing the C.N.O. Railway to divert side road and Concession Road, at Station 313, Township Scarborough, Ont.
- 9404—January 27—Dismissing application of the municipality of Scarborough Township, York County, Ontario, for Order directing C.N.O. Railway to construct its railway across public road between Lots 14 and 15, Con. 3, at Station 625.

- 9405—January 27—Dismissing application of Edward Clark & Son, Toronto, Ont., complaining of refusal of the C.O.R. to furnish cars for the shipment of lumber on its branch line between Marmora Junction and Cordova, Ont.
- 9406—January 31—Authorizing the C.P.R. to use and operate bridges Nos. 20.13, 26.73, and 87.62 on its Soo Branch, Lake Superior Division.
- 9407—January 27—Directing C.P.R. to acquire necessary land on Dundas Street, Cooksville, Ont., north and south sides of the track to give a clear view of approaching trains in either direction.
- 9408—January 27—Directing the G.T.R. within six months from date of this order to install and maintain bells at Lancaster and Strange Street crossings on the main line, and Queen and Mill Streets on the Galt Branch of the railway in the town of Berlin, Ont.
- 9409—January 31—Authorizing the C.P.R. to use and operate bridges 61.48, 83.23, and 98.76 on its North Bay section.
- 9410—January 31—Authorizing the C.N.O. Railway to divert public road on Lots 418 and 419, in Parish of St. Augustine, at mileage 19.23, west from Quebec Bridge.
- 9411—January 31—Approving location of the G.T.R. Pacific Branch Lines Company from Sec. 8, Tp. 17, R. 19, to Sec. 23, Tp. 11, R. 15, W. 2nd Mer., District of Assiniboia, Sask., mileage 4, to mileage 50.
- 9412—January 27—Authorizing the C.N.O. Railway to construct its tracks across public road between part of Lot 32, Con. "C," and part of Lot 32, Con. "B," at Station 23795, Township of Scarborough.
- 9413—January 27—Authorizing the C.N.O. Railway to construct its tracks across public road between south part of Lot 22, Con. 2, and the north part of Lot 22, Con. 1, at Station 477, Township of Scarborough.
- 9414—January 27—Authorizing the C.N.O. Railway to construct its tracks across public road between Lots 18 and 19, Con. 2, Tp. of Scarborough.
- 9415—January 31—Approving foundation plan, etc., of trestle for bridge No. 17, at mileage 53.17, Breche a Manon, Atlantic, Quebec, & Western Railway.
- 9416—January 31—Bridge No. 19 at 1st crossing, East Branch, Anse a Beau Fils, mileage 65.3.
- 9417—January 31—Bridge No. 21, 3rd crossing, East Branch, Anse a Beau Fils.
- 9418—January 31—Bridge No. 24, at mileage 88, Anse a Brillant.
- 9419—January 31—Bridge No. 20, at the 2nd crossing, East Branch, Anse a Beau Fils, mileage 65.4.
- 9420—January 31—Bridge No. 25, Seal Cove, at mile. 92.3, Province of Quebec.
- 9421—January 31—Bridge No. 23 over south-west branch, Bois Bru'e, mileage 85.4.
- 9422—Jan. 31—Authorizing the C.N.O. Railway to divert public road on Lots 463 and 456, Parish of St. Augustine, at mileage 17.22, west from Quebec Bridge.
- 9423—January 31—Authorizing the Vancouver, Victoria & Eastern Railway to construct, maintain and operate spur to premises of Daly Reduction Company, at Hedley, B.C.
- 9424—January 31—Authorizing the C.P.R. to construct a hand-rail along the retaining wall between Sohmer Park Corner and Vootigeurs St., Montreal.
- 9425—January 31—Authorizing the Atlantic, Quebec & Western Railway to construct bridges at mileages 40.8, 46.7, 76.9, and 95.8, subject to certain conditions.
- 9426—January 27—Authorizing the T. H. & B. Railway to construct two spurs to the premises of F. W. Bird & Son, Hamilton, Ont.
- 9427—January 31—Authorizing the Province of Alberta to carry tele- phone wires across the tracks of the Grand Trunk Pacific at Sec. 33, Tp. 52, R. 27, west of 4th Meridian, 3 miles east of Stony Plain, Alta.

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, February 16th, 1910.

Dullness continues in the pig-iron markets of the United States, although it would be a little difficult to explain why this should be. The underlying conditions have not in any way changed during the past two or three months, the country being very prosperous, and there being every indication that it will continue so. The present unsettled condition appears to be largely sentimental and, while many authorities have attempted to offer an explanation, no two seem to agree. Among the reasons offered is that of restrictive legislation concerning what is known as trusts. This is no new development, it having formed part of the Roosevelt policy which has been under discussion for two or three years past. Whatever the explanation, however, the fact remains that trade conditions are ever the explanation, as good as they were during the latter part of last year. Local dealers regard the relapse simply as the natural result of the over-optimism and exceptional activity which prevailed a short time since, and they believe that the present situation will be followed by a renewal of the previous activity.

During the past week, the price of standard Bessemer pig-iron, which has been pegged at \$10, Valley furnaces, for some time past, was upset by a sale made by the Bessemer Association to the United States Corpora-

tion at a reduction of \$1 per ton, making the price \$18, deliveries during the next three months. Heretofore, the spread between standard Bessemer and basic and foundry grades has been much greater than customary, and it was felt that either Bessemer would have to come down or the other grades go up. The concessions in Bessemer are felt to be a move in the direction of encouraging further heavy buying, for delivery spread over the present year.

It would seem that the quantity of foundry and steel making grades of iron being used is greater than ever before, so that a good buying movement is almost assured as soon as present stocks are reduced.

English criticism is that the Americans change their viewpoint over night, and that much of what takes place in their market cannot be regarded as final.

English and Scotch conditions continue satisfactory with moderate improvement. Prices have not been materially advanced during the past two or three weeks, but trade conditions continue good, and both buyers and sellers are evidently looking forward to stronger market conditions during the spring and summer months. Foreign demand is satisfactory and home consumption keeps up at a very fair gait. Scotch makers, especially, are well pleased with the situation and are anticipating higher prices. Reports from Germany and Belgium are also very favorable, both as to volume of business and the price obtained.

For the first time in several months, the quantity of Middlesboro pig-iron put into warrant stores has been reduced to almost nothing. From an average of 5,000 or 6,000 tons per week, it came down to 50 tons, only, for last week in January.

The Canadian market is very encouraging. Foundries, rolling mills and blast furnace interests are filled with orders, and prospects for even better conditions are constantly presenting themselves. Prices have not altered much during the past two or three weeks, and the tendency for the moment is about steady. Providing Canada is favored with the usual good crops, it looks as though nothing would arise to hold back prosperity. Extensive railway building is in contemplation, as is also large construction work of other natures, and the steel business at least will be fully occupied for many months to come.

Looking over the market for finished and semi-finished iron and steel products no change becomes apparent this week. In fact, even the strength and the advances which many thought would take place before the end of this or next month, seem more or less in question, at the moment, the situation in the United States showing weakness rather than strength, recently. It is difficult to forecast with any accuracy the immediate future in prices of the materials referred to, but there is every reason to expect a good trade this season, and one might look for firmness to accompany such a situation.

Antimony.—The market is steady at 8 to 8½c. (111).

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 ¾-base; tire steel, \$1.00 for 1 x ¾-base; toe calk steel, \$2.35; machine steel, iron finish, \$1.90; imported, \$2.20 (111, 119)

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). (164).

Cement.—Canadian cement is quotable, as follows, in car lots, f.o.b., Montreal:—\$1.30 to \$1.40 per 350-lb. bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½ cents extra, or 10c. per bbl. weight. (26, 86, 164).

Chain.—Prices are as follows per 100 lbs.:—¼-inch, \$4.90; 5-16-inch, \$4.40; ¾-inch, \$3.70; 7-16-inch, \$3.50; ½-inch, \$3.25; 9-16-inch, \$3.20; ¾-inch, \$4.15; ¼-inch, \$3.10; ¾-inch, \$3.05; 1-inch, \$3.05.

Coal and Coke.—Anthracite, cgs, 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, \$4 per ton; coke, single ton, \$5; large lots, special rates, approximately \$4 f.o.b., cars, Montreal

Copper.—Prices are strong at 14 to 14½c.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 45c. in single case lots, Montreal. Blasting powder, 25-lb. kegs, \$2.25 per keg. Special quotations on large lots of dynamite and powder. Detonator caps, case lots, containing 10,000, 75c. per 100; broken lots, \$1; electric blasting apparatus:—Batteries, 1 to 10 holes, \$15; 1 to 20 holes, \$25; 1 to 30 holes, \$35; 1 to 40 holes, \$50. Wire, leading, 1c. per foot; connecting, 50c. per lb. Fuses, platinum, single strength, per 100 fuses:—4-ft. wires, \$3; 6-ft. wires, \$3.54; 8-ft. wires, \$4.08; 10-ft. wires, \$5.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, \$4.10; Colborne Crown, \$3.85; Apollo, 10¼ 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 10¼ oz., and English 28-gauge. (111).

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. (111).

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 c. rate to Montreal. Telegraph Poles: Seven-inch top, cedar poles, 25-ft. poles, \$1.35 to \$1.50 each; 10-ft., \$1.75 to \$2; 35-ft., \$2.75 to \$3.25 each, at manufacturers' points, with c. freight rate to Montreal. Laths: Quotations per 1,000 laths, at points carrying \$1.50 freight rate to Montreal, \$2 to \$2. Shingle: Cedar shingles, same conditions as laths, X, \$1.50; XX, 2.50; XXX, \$3. (112)

Nails.—Demand for nails is better and prices are firmer, \$2.40 per keg for cut, and \$2.25 for wire, base prices. Wire roofing nails, 2c. lb.

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

Pipe, Cast Iron.—The market shows a steady tone although demand is on the dull side. Prices are firm, and approximately as follows:—\$32 for 6 and 8-inch pipe and larger; \$33 for 3-inch and 4-inch at the foundry. Pipe, specials, \$3 per 100 pounds. Gas pipe is quoted at about \$1 more than the above. (74, 188).

Pipe.—Wrought and Galvanized.—Demand is about the same, and the tone is firm, though prices are steady, moderate-sized lots being: ¼-inch, \$5.50 with 63 per cent. off for black, and 48 per cent. off for galvanized; ½-inch, \$5.50, with 59 per cent. off for black and 44 per cent. off for galvanized; ¾-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; 1-inch, \$11.50; 1½-inch, \$16.50; 2-inch, \$22.50; 2½-inch, \$27; 3-inch, \$36; 3½-inch, \$37.50; 4-inch, \$45.50; 5-inch, \$55; 6-inch, \$65.

Plates and Sheets.—Steel.—The market is steady. Quotations are: \$2.20 for 3-16; \$2.30 for ¼, and \$2.10 for ½ and thicker; 12-gauge being \$2.30; 14-gauge, \$2.15; and 16-gauge, \$2.10. (111).

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. (73).

Railway Ties.—See lumber, etc.

Roofing.—Ready roofing, two-ply, 70c. per roll; three-ply, 95c. per roll of 100 square feet. Roofing tin caps, 6c. lb.; wire roofing nails, 5c. lb. (See Building Paper; Tar and Pitch; Nails, Roofing). (164).

Rope.—Prices are steady, at 9c. per lb. for sisal, and 10½c. for Manila. Wire rope, crucible steel, six-strands, nineteen wires; ¼-in., \$2.75; 5-16, \$3.75; ¾, \$4.75; 1, \$5.25; 1½, \$6.25; 2, \$8; 2½, \$10; 3-in., \$12 per 100 feet. (132).

Spikes.—Railway spikes are firmer at \$2.45 per 100 pounds, base of 5½ x 9-16. Ship spikes are steady at \$2.85 per 100 pounds, base of ¾ x 10-inch, and ¾ x 12-inch. (132).

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

Telegraph Poles.—See lumber, etc.

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

Tin.—Prices are unchanged, at 3½ to 33c.

Zinc.—The tone is steady, at 6 to 6½c.

CAMP SUPPLIES.

Beans.—Prime pea beans, \$1.85 per bushel. (38).

Butter.—September and October creamery, 26c.; dairy, 22 to 23c.

Canned Goods.—Per Dozen.—Corn, 80 to 85; peas, \$1.05 to \$1.15; beans, 75 to 80c.; tomatoes, 82½ to 90c.; peaches, 25, \$1.65, and 35, \$2.65; pears, 25, \$1.60, and 35, \$2.30; salmon, best brands, 1-lb. talls, \$1.87½, and flats, \$2.02½; cheaper grades, 95c. to \$1.65.

Cheese.—Late makes, 11¼ to 11¾c.; finest makes, ¼c. more.

Coffee.—Mocha, 20 to 25c.; Santos, 15 to 18c.; Rio, 10 to 12c. (38).

Dried Fruits.—Currants, Filiatras, 5¼ to 6¾c.; choice, 8 to 9c.; dates, 4 to 5c.; raisins, Valentias, 5 to 6c.; California, seeded, 7½ to 9c.; Sultana, 8 to 10c. Evaporated apples, prime, 9½ to 9¾c.

Eggs.—No. 1 candled, 26c.; and select, 29 to 30c.; new laid, 35c.

Flour.—Manitoba, 1st patents, \$5.70 per barrel; 2nd patents, \$5.20; strong bakers, \$5.

Molasses and Syrup.—Molasses, New Orleans, 27 to 28c.; Barbadoes, 40 to 50c.; Porto Rico, 40 to 45c.; syrup, barrels, 3½c.; 2-lb. tins, 2 dozen to case, \$2.50 per case.

Potatoes.—Per 90 lbs., good quality, 50 to 60c.

Rice and Tapioca.—Rice, grade B., in 100-lb. bags, \$2.95 to \$3; C.C., \$2.90. Tapioca, medium pearl, 4½ to 4¾c.

Rolled Oats.—Oatmeal, \$2.45 per bag; rolled oats, \$2.20, bags.

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

Provisions.—Salt Pork, \$30 to \$32 per bbl.; beef, \$15 per bbl.; smoked hams and bacon, 15 to 18c. per lb.; lard, 17c. for pure and 12c. for compound. (38).

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

* * * *

Toronto, February 17th, 1910.

Mill's in the United States take a long time to deliver iron and steel material. In heavy goods, say, 2 to 4 months, or as long probably as old country delivery, so that the demand for heavy goods is maintained. The activity of movement among our American neighbors continues, which makes it likely that prices will not easily be reduced. Prices of other metals are, as a rule, unchanged. Canadian pig-iron producers continue busy, and hardware manufacturers do not appear to have altered quotations.

Soft coal is scarce, especially slack coal, while the prices have not been much affected. Some fears as to labor troubles account for this scarcity, as various railways are endeavoring to get some coal ahead. Coke is more difficult to obtain, and shipments are slow. Heavy snow in the mining country in the States is another cause, making shipments irregular.

A peculiar and marked advance has taken place in white wood, or yellow poplar, the material for bodies of automobiles, in the United States. The advance is placed as high as 70 to 80 per cent. within six weeks, say from \$75 per M, to \$140. Ash, too, is somewhat higher, the output of autos. being enormous. For all kinds of pine the Canadian market is firm, first-class boards being especially in request and scarce. An illustration of the market is the fact that sale was made in Ottawa the other day of a large lot of clear pine strips at \$50 per M, while 5 and 7-inch strips changed hands at \$42.

Among the signs that the Americans are "feeling good" is the fact that three of the large automobile factories in Detroit are enlarging their plants. The output is enormous.

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

Antimony.—Demand quiet at 9c. per 100 lbs. (111).

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

Bar Iron.—\$2.00 to \$2.10, base, per 100 lbs., from stock to wholesale dealer. Market supply limited. (111).

Bar Mild Steel.—Per 100 lbs., \$2.10 to \$2.20.

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

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

Building Paper.—Plain, 30c. per roll; tarred, 40c. per roll. Demand is good for spring requirements.

Bricks.—A very active season has closed, and prices are as below. Prospects excellent for business in 1910. Price at some yards \$9 to \$9.50, at others, \$9.50 to \$10 for common. Don Valley pressed brick move also freely. Red and buff pressed are worth \$18 delivered and \$17 at works per 1,000.

Broken Stone.—Lime stone, good hard, for roadways or concrete, f.o.b., Schaw station, C.P.R., 75c. until further notice, per ton of 2,000 lbs., 1-inch, 2-inch, or larger, price all the same. Not much doing. Broken granite is selling at \$3 per ton for good Oshawa. (164).

Cement.—The figure of \$1.60 may still be quoted at Toronto in car lots per barrel without bags. A large contract recently closed by the city was at \$1.57. In smaller parcels \$1.70 is asked by city dealers, plus bags, (26, 86, 169).

Coal.—Retail price for Pennsylvania hard, \$7.25 net, steady. This price applies to grate, eggs, stove, and chestnut; only pea coal is cheaper, namely, \$6.00. These are all cash, and the quantity purchased does not affect the price. In the United States there is an open market for bituminous coal and a great number of qualities exist. We quote. Youghiogeny lump coal on cars here, \$3.70 to \$3.80; mine run, \$3.60 to \$3.75; slack, 2.65 to \$2.85; lump coal from other districts, \$3.40 to \$3.70; mine run roc. less; slack, 2.50 to \$2.70; cannel coal plentiful at \$7.50 per ton; coke, Solvey foundry, which is largely used here, quotes at from \$5.75 to \$6.00; Reynoldsville, \$4.90 to \$5.00; Connellsview, 72-hour coke, \$5.50. Soft coal and slack are scarce.

Copper Ingot.—The speculative movement has been very great and it is not easy to forecast the future. The price here is higher at 14½c. per lb., and the demand active.

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

Dynamite, per pound, 21 to 25c., as to quantity. (83.)

Felt Roofing.—A good prospect for spring trade at an unchanged price, which is \$1.80 per 100 lbs.

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

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

Iron Chain.—¼-inch, \$5.75; 5-16-inch, \$5.15; ¾-inch, \$4.15; 7-16-inch, \$3.95; ½-inch, \$3.75; 9-16-inch, \$3.70; 5/8-inch, \$3.55; ¾-inch, \$3.45; 7/8-inch, \$3.40; 1-inch, \$3.40, per 100 lbs.

Iron Pipe.—A steady request at former prices:—Black, ¾-inch, \$2.03; 1-inch, \$2.25; 1¼-inch, \$2.63; 1½-inch, \$3.28; 2-inch, \$4.70; 2½-inch, \$6.41; 3-inch, \$7.70; 3½-inch, \$10.26; 4-inch, \$16.39; 4½-inch, \$21.52; 5-inch, \$27.08; 6-inch, \$30.78; 7-inch, \$35.75; 8-inch, \$39.85; 9-inch, \$51.70. Galvanized, ¾-inch, \$2.86; 1-inch, \$3.08; 1¼-inch, \$3.48; 1½-inch, \$4.43; 2-inch, \$6.35; 2½-inch, \$8.66; 3-inch, \$10.40; 4-inch, \$13.86, per 100 feet. (74, 188).

Lead.—An active demand at firm prices, say \$3.75 to \$3.85 per 100 lbs.

Lime.—Retail price in city 35c. per 100 lbs. f.o.b., car; in large lots at kilns outside city 22c. per 100 lbs. f.o.b. car without freight. Demand is moderate.

Lumber.—Prices are generally firm, especially in pine. We quote dressing pine \$32.00 to \$35.00 per M; common stock boards, \$26 to \$30; cull stocks, \$20; cull sidings, \$17.50; Southern pine dimension timber from \$30 to \$45, according to size and grade; finished Southern pine according to thickness and width, \$30 to \$40. Hemlock in car lots, \$16.50 to \$17; spruce flooring in car lots, \$22 to \$24; shingles, British Columbia, are higher, we quote \$3.10; lath growing scarce and stiffening, No. 1, \$4.40, white pine, 48-inch; No. 2, \$3.75; for 32-inch, \$1.60.

Nails.—Wire, \$2.35 base; cut, \$2.60; spikes, \$2.85 per keg of 100 lbs.

Pitch and Tar.—Pitch, unchanged at 70c. per 100 lbs. Coal tar dull at \$3.50 per barrel. This is the dead season.

Putty.—In bladders, strictly pure, per 100 lbs., \$2.25; in barrel lots, \$2.10. Plasterer's, \$2.15 per barrel of three bushels.

Ready Roofing.—Little doing; prices are as per catalogue.

Roofing Slate.—Most of the slate used in Canada comes now from Pennsylvania or Maine, the Canadian supply being slender and mostly from the Rockland quarries of the Eastern Townships in Quebec. There is a great variety of sizes and qualities, so that it is difficult to indicate prices. But No. 1 Bangor slate 10 x 16 may be quoted at \$7 per square of 100 square feet, f.o.b., cars, Toronto; seconds, 50c. less. Mottled, \$7.25; green, \$7.

Pig Iron.—There is great activity and prices are maintained. Clarence quotes at \$21 for No. 3; Cleveland, \$20.50 to \$21, Summerlee, for winter delivery, \$22.50 in Canadian pig. Hamilton quotes \$19.50 to \$20 per ton. Producing plants are everywhere busy, and there is considerable business in prospect for 1910.

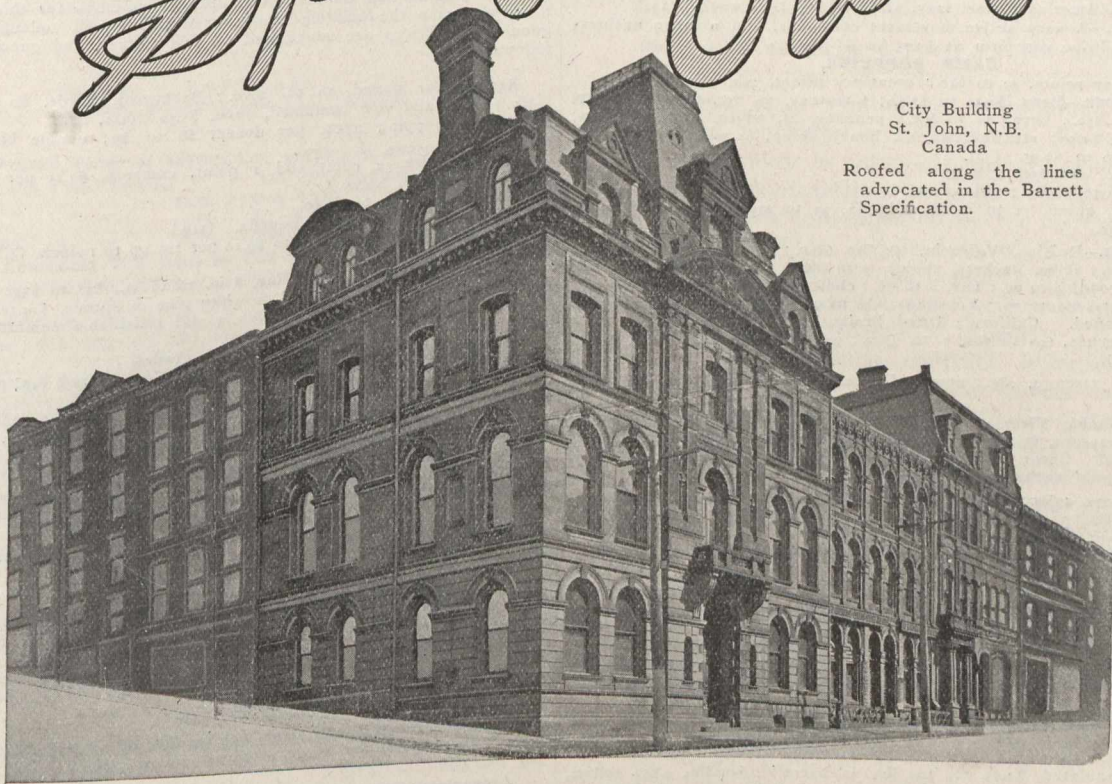
Plaster of Paris.—Calcined, New Brunswick, hammer brand, car lots, \$1.95; retail, \$2.15 per barrel of 100 lbs.

Rope.—Sisal, 9½c. per lb.; pure Manila, 10½c. per lb., Base.

Sewer Pipe.—

	4-in.	6-in.	9-in.	10-in.	12-in.	24-in.
Straight pipe per foot	\$0.20	\$0.30	\$0.65	\$0.75	\$1.00	\$3.25
Single junction, 1 or 2 ft. long	.90	1.35	2.70	3.40	4.50	14.65
Double junctions	1.50	2.50	5.00	....	8.50	....
Increasers and reducers	....	1.50	2.50	....	4.00	....
P. traps	2.00	3.50	7.50	....	15.00	....
H. H. traps	2.50	4.00	8.00	....	15.00	....

Barrett Specification Roofs



City Building
St. John, N.B.
Canada
Roofed along the lines
advocated in the Barrett
Specification.

After Twenty-Seven Years of Service

THE roof of this structure was laid in 1882. A letter recently received from the contractors states that it is still in good order after 27 years of service.

As compared with other kinds of roofing, and considering the wide variation of temperature in New Brunswick, this is an astonishing record. It emphasizes the satisfactory results which Barrett Specification Roofs invariably give.

The architect or owner of a building who will order his roofing laid "according to The Barrett Specification" and insist that the Speci-

fication be followed to the letter, is absolutely assured of *satisfactory service*.

It is well to remember that with Barrett Specification Roofs there is no maintenance expense whatever. Metal and Ready Roofings *require paint and attention every few years* to insure freedom from leaks and trouble.

Every architect, engineer and owner should have The Barrett Specification on file. We will send same promptly to anyone interested on request to our nearest office.

PATERSON MANUFACTURING CO., LTD.
Toronto Montreal Winnipeg Vancouver St. John, N.B. Halifax, N.S.

Business quieter; price, 73 per cent. off list at factory for car-load lots; 65 per cent. off list retail. Small lots subject to advance. (52, 84, 138).

Steel Beams and Channels.—Quiet.—We quote:—\$2.50 to \$2.75 per 100 lbs., according to size and quantity; if cut, \$2.75 to \$3 per 100 lbs.; angles, 1½ by 3-16 and larger, \$2.50; tees, \$2.80 to \$3 per 100 pounds. Extra for smaller sizes of angles and tees. (30, 41, 50, 4, 176, 127, 132, 145, 118, 119).

Steel Rails.—80-lb., \$35 to \$36 per ton. The following are prices per gross ton, for 500 tons or over; Montreal, 12-lb. \$45, 16-lb. \$44, 25 and 30-lb. \$43.

Sheet Steel.—The market continues steady; American Bessemer, 10-gauge, \$2.50; 12-gauge, \$2.55; 14-gauge, \$2.35; 17, 18, and 20-gauge, \$2.45; 22 and 24-gauge, \$2.50; 26-gauge, \$2.65; 28-gauge, \$2.85. Quite a good demand exists, and there is prospect of higher prices.

Sheets Galvanized.—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, \$2.90; 12-14-gauge, \$3.00; 16, 18, 20, \$3.10; 22-24, \$3.25; 26, \$3.40; 28, \$3.85; 29, \$4.15; 30½, \$4.15 per 100 lbs. Fleur de Lis—28-gauge, \$4; 26, \$3.80 per 100 lbs. A very large tonnage of all sorts has been booked. The feeling is toward an advance. (111).

Tank Plate.—3-16-inch, \$2.40 per 100 lbs.

Tool Steel.—Jowett's special pink label, 10¼c. Cammel-Laird, 16c. "H.R.D." high speed tool steel, 65c. (4).

Tin.—The price is now steady at 34½ to 35c.

Wheelbarrows.—Navy, steel wheel, Jewel pattern, knocked down, \$21.60 per dozen; set up, \$22.60. Pan Canadian, navy, steel tray, steel wheel, \$3.30 each; Pan American, steel tray, steel wheel, \$4.25 each. (132).

Zinc Spelter.—A very active movement continues, and a large business is being done. Price very firm at \$5.75 to \$6 per 100 lbs.

CAMP SUPPLIES.

Butter.—Dairy prints, 23 to 24c.; creamery prints, 29c. per lb.

Canned Goods.—Peas, \$1.10 to \$1.50; tomatoes, 35, 85c. to 95c.; pumpkins, 35, 80 to 85c.; corn, 80 to 85c.; peaches, 25, white, \$1.50 to \$1.60; yellow, \$1.90 to \$1.95; strawberries, 25, heavy syrup, \$1.50 to \$1.85; raspberries, 25, \$1.50 to \$1.95. (38).

Carrots.—60c. and 65c. a bag.

Cheese.—Large, 12¼c.; twins, 13c.

Coffee.—Rio, green, 11 to 12¼c.; Mocha, 21 to 23c.; Java, 20 to 31c.; Santos, 11 to 15c.

Dried Fruits.—Raisins, Valencia, 5½ to 6¼c.; seeded, 1-lb. packets, fancy, 7½ to 8c.; 16-oz. packets, choice, 7 to 7½c.; 12-oz. packets, choice, 7c.; Sultanas, good, 5 to 6c.; fine, 6 to 7c.; choice, 7 to 8c.; fancy, 8 to 9c.; Filiatras currants, 6½ to 7c.; Vostizzas, 8½ to 9c.; uncleaned currants, ¼c. lower than cleaned. California Dried Fruits.—Evaporated apricots, 15 to 16c. per lb.; prunes, 60s to 70s, 7 to 7½c.; 90s to 100s, 6½c.; evaporated apples, 8c. (38).

Eggs.—Cold storage, 28c.; new laid, lower, at 30 to 31c. per dozen, in case lots.

Flour.—Manitoba Flour.—Quotations at Toronto are:—First patents, \$5.60; second patents, \$5.10; strong bakers', \$4.90; 90 per cents., Glasgow freights, 28s. 6d. Ontario Flour.—Winter wheat patents, for export, \$4.20 to \$4.25, in buyers' sacks outside.

Lard.—Tierces, 15¼c.; tubs, 15¼c.; pails, 16c.

Molasses.—Barbadoes, barrels, 37 to 45c.; West Indian, 27 to 30c.; New Orleans, 30 to 33c. for medium.

Pork.—Market uncertain. Short cut, \$29 per barrel; mess, \$27. Light stocks and not much doing.

Rice.—B. grade, 3¼c. per lb.; Patna, 5 to 5¼c.; Japan, 5 to 6c.

Salmon.—Fraser River, talls, \$2; flats, \$2; River Inlet, \$1.55 to \$1.75.

Smoked and Dry Salt Meats.—Long clear bacon, 14¼c. per lb., tons and cases; hams, large, 14 to 14¼c.; small, 16c.; rolls, 14½ to 14¾c.; breakfast bacon, 18c.; backs (plain), 18½ to 19c.; backs (peameal), 18c. to 19c.; shoulder hams, 13c.; green meats out of pickle, 1c. less than smoked. Market steady.

Spices.—Allspice, 16 to 19c.; nutmegs, 30 to 75c.; cream tartar, 22 to 25c.; compound, 15 to 20c.; pepper, black, pure Singapore, 14 to 17c.; pepper, white, 20 to 30c.

Sugar.—Granulated, \$4.95 per 100 lbs. in barrels; Acadia, 4.85; yellow, \$4.55; bags, 5c. lower.

Syrup.—Corn syrup, special bright, 3¼c. per lb.

Teas.—Japans, 20 to 35c. per lb.; Young Hysons, 16 to 35c.; Ceylons, medium, 16 to 45c.

Vegetables.—Beans, hand-picked, \$2.25; prime, \$2.15; stocks light, market firm; beets, 85c. a bag; carrots, 60 and 65c. a bag; onions, \$1.25 a bag; potatoes, best, 65 and 70c. a bag; turnips, 45c. a bag. (38).

TORONTO HORSE MARKET.

Two hundred and seventy-eight horses have been consigned to the Union Stock Yards for sale this week, and of these at least 125 will be out of the stables by Saturday. Most of those sold are going to the West, but two loads are going to lumber camps. The demand for the woods has been extra strong this winter, and prices are very high. Young, sound horses, 1,600 lbs., and up, are going up to \$500 per pair. Drafters are going at 180 to \$220 each; delivery horses, \$160 to \$200; farm chunks, \$125 to \$180, and serviceably sound at \$35 to \$80.

* * * *

Winnipeg, February 15th, 1910.

Local dealers in builders' supplies are placing large orders, a great deal of which is for immediate delivery, so as to be in good shape to handle the rush of the coming season. A big rush is expected on every hand, and the outlook for the building trades is brighter than ever before. Some contractors are afraid that there will be a shortage of supplies in Winnipeg, such as cement, etc., but this is not likely to occur, for, while there are no large stocks on hand now, just as soon as navigation opens supplies will begin to pour in. Ideal weather has been experienced in Winnipeg this winter so far, and Building Inspector Rodgers states that more men are working at construction and other trades in and around Winnipeg at the present time than in any previous year in the mid-winter season. Cement is dull, and from all reports there is very little on hand in Winnipeg. The city are calling for tenders for their first supply of 25,000 barrels, and it will be interesting to know at what price this will be bought at. Local architects are very busy with plans for the coming

"ORB" and "REDCLIFFE" Corrugated Iron

Well Galvanized, soft, uniform in weight

John Lysaght, Limited
Makers, Bristol

A. C. Leslie & Co., Ltd.
Montreal

2

season, and it is stated on good authority that they have plans on hand now for nine million dollars worth of new buildings for this year. This being the case the building trades in Winnipeg will undoubtedly have a good year. Prices are unchanged on this market, and quotations are as follows:—

Anvils.—Per pound, 10 to 12¼c.; Buckworth anvils, 80 lbs., and up, 10¼c.; anvil and vice combined, each, \$5.50 (111, 132).

Axes.—Chopping axes, per dozen, \$6 to \$9; double bits \$12.10 per dozen.

Barbed Wire.—4 point and 2 point, common, \$3.15 per cwt.; Baker, \$3.20; Waukegan, \$3.30.

Bar Iron.—\$2.50 to \$2.60.

Bars.—Crow, \$4 per 100 pounds. (119).

Beams and Channels.—\$3 to \$3.10 per 100 up to 15-inch. (4, 30, 41, 50, 118, 119, 127, 132, 145, 176.)

Boards.—No. 1 Common Pine, 8 in. to 12 in., \$38 to \$45; siding, No. 2 White Pine, 6 in., \$55; cull red or white pine or spruce, \$24.50; No. 1 Clear Cedar, 6 in., 8 to 16 ft., \$60; Nos. 1 and 2 British Columbia spruce, 4 to 6 in., \$55; No. 3, \$45.

Bricks.—\$10, \$11, \$12 per M, three grades.

Building Paper.—¼ to 7c. per pound. No. 1 tarred, 84c. per roll; plain, 60c.; No. 2 tarred, 62¼c.; plain, 56c.

Coal and Coke.—Anthracite, egg, stove or chestnut coal, \$9.75 large lots to \$10.50 ton lots, net; Alleghany soft coal; carload lots, basis, Winnipeg, f.o.b., cars, \$6 per ton; canal coal, \$10.50 per ton; Galt coal, \$3 f.o.b., carload lots, \$9 single ton; coke, single ton, \$7 at yard; large lots, special rates. American coke, \$11 to \$11.50 a ton; Crow's Nest, \$11 a ton.

Copper Wire.—Coopered market wire, No. 7, \$4 per 100 lbs.; No. 6, \$4; No. 10, \$4.06; No. 12, \$4.20; No. 14, \$4.40; No. 16, \$4.70.

Copper.—Tinned, boiler, 26¼c.; planished, 29¼c.; boiler and T. K. pits, plain, tinned, 45 per cent. discount.

Cement.—\$2.25 to \$2.50 per barrel, in cotton bags.

Chain.—Coil, proof, ¼-inch, \$7; 5-16-inch, \$5.50; ¾-inch, \$4.90; 7-16-inch, \$4.75; ½-inch, \$4.40; ¾-inch, \$4.20; ¾-inch, \$4.05; logging chain, 5-16-inch, \$6.50; ¾-inch, \$6; ¾-inch, \$8.50; jack iron, single, per dozen yards, 15c. to 75c.; double, 25c. to \$1; trace-chains, per dozen, \$5.25 to \$6.

Dynamite.—\$11 to \$13 per case.

Hair.—Plasterers', 80 to 90c. per bale.

Hinges.—Heavy T and strap, per 100 lbs., \$6 to \$7.50; light, do., 65 per cent.; screw hook and hinge, 6 to 10 inches, 5¼c. per lb.; 12 inches up, per lb., 4¼c.

Galvanized Iron.—Apollo, 10¼, \$4.90; 28, \$4.70; 26, \$4.30; 22, \$4.10; 24, \$4.10; 20, \$4; 18, \$3.95; 16, \$3.90; Queen's Head, 28, \$4.90; 26, \$4.70; 24, \$4.30; 22, \$4.30; 20, \$4.10 per cwt.

Iron.—Swedish iron, 100 lbs., \$4.75 base; sheet, black, 14 to 22 gauge, \$3.75; 24-gauge, \$3.90; 26-gauge, \$4; 28-gauge, \$4.10. Galvanized—American,

Lead Wool.—\$10.50 per hundred, \$200 per ton, f.o.b., Toronto.

Lumber.—No. 1 pine, spruce, tamarac, British Columbia fir and cedar—2 x 4, 2 x 6, 2 x 8, 8 to 16 feet, except 10 feet, \$27; 2 x 20 to 2 x 40, up to 32 feet, \$40.

Nails.—\$4 to \$4.25 per 100. Wire base, \$2.85; cut base, \$2.90.

Picks.—Clay, \$5 per dozen; pick mattocks, \$6 per dozen; clevises, 7c. per lb. (132).

Pipe.—Iron, black, per 100 feet, ¼-inch, \$2.50; ½-inch, \$2.80; ¾-inch, \$3.40; 1-inch, \$4.60; 1-inch, \$6.60; 1¼-inch, \$9; 1½-inch, \$10.75; 2-inch, \$14.40; galvanized, ½-inch, \$4.25; ¾-inch, \$5.75; 1-inch, \$8.35; 1¼-inch, \$11.35; 1½-inch, \$13.60; 2-inch, \$18.10. Lead, 6¼c. per lb.

Pitch.—Pine, \$6.50 per barrel; in less than barrel lots, 4c. per lb.; roofing pitch, \$1 per cwt.

Plaster.—Per barrel, \$3.

Roofing Paper.—60 to 67¼c. per roll.

Rope.—Cotton, ¼ to ½-in. and larger, 23c. lb.; deep sea, 16¼c.; lath yarn, 9½ to 9¼c.; pure Manila, per lb., 13¼c.; British Manila, 11¼c.; sisal, 10¼c. (132).

18 to 20-gauge, \$4.40; 22 to 24-gauge, \$4.65; 26-gauge, \$4.65; 28-gauge, \$4.90; 30-gauge, \$5.15 per 100 lbs. Queen's Head, 22 to 24-gauge, \$4.65;

26-gauge English, or 30-gauge American, \$4.90; 30-gauge American, \$5.15; Fleur de Lis, 22 to 24-gauge, \$4.50; 28-gauge American, \$4.75; 30-gauge American, \$5. (119).

Spikes.—Basis as follows:—1¼ x 5 and 6, \$4.75; 5-16 x 5 and 6, \$4.40; ¼ x 6, 7 and 8, \$4.25; ½ x 8, 9, 10, and 12, \$4.05; 25c. extra on other sizes.

Steel Plates, Rolled.—3-16-in., \$3.35 base; machinery, \$3 base; share, \$4.50 base; share crucible, \$5.50; cast share steel, \$7.50; toe calk, \$4.50 base; tire steel, \$3 abse; cast tool steel, lb., 9 to 12¼c.

Staples.—Fence, \$3.40 per 100 lbs. (119).

Timber.—Rough, 8 x 2 to 14 x 16 up to 32 feet, \$36; 6 x 20, 8 x 20, up to 32 feet, \$40.

Tool Steel.—8½ to 15c. per pound.