THIS ISSUE CONTAINS | Report of Annual Meeting of the Canadian Society of Civil Engineers

Canadian Engineer

A WEEKLY JOURNAL
For CIVIL, MECHANICAL, ELECTRICAL and STRUCTURAL ENGINEERS and CONTRACTORS
MONTREAL OFFICE: B 32 Board of Trade Building
WINNIPEG OFFICE: 315 Nanton Building

Vol. 16. Toronto, Canada, February 5, 1909. No. 6.

BUYERS' REFERENCE—PAGE 54.

INDEX TO ADVERTISEMENTS.

* Every Other Week

† Once a Month

PLEASE bear our publication in mind at ALL times and send us news—news of the commencement, progress or the completion of work; news of contracts to be let; personal items telling of the promotion or transfer of engineers and contractors.

CONSULTING ENGINEERS

A.M.C.S.C.E. *Ass.A.I.E.E.*
DeGASPÉ BEAUBIEN
B. Sc.
CONSULTING ELECTRICAL ENGINEER
Liverpool & London & Globe Bldg., MONTREAL

Superintends Construction and Repairs
20 Years' Experience
JOHN W. GERELL
Canadian Respresentative
ROBERT STEPHENSON & CO., Ltd.
Shipbuilders, Hebburn-on-Tyne
Consulting Engineer Naval Architect
Designs, Specifications and Estimates for all classes of Marine Vessels and Machinery
phone M. 6555 TORONTO 43 Victoria Street

Alf. Oldfield, Assoc. Mem. Can. Soc. C.E.
OLDFIELD, WINFIELD CO.
CONSULTING CIVIL ENGINEERS AND SURVEYORS
Suite 211 Kennedy Bldg., Portage Ave.,
Phone, 8330. **Winnipeg, Man.**
Waterworks. Sewerage and Sewerage Purification Works. Street Railway construction. Electric Light and Power Plants. Reports, Estimates and Surveys.

H. J. BOWMAN, M. Can. Soc. C. E.
A. W. CONNOR, B.A., C.E., A.M. Can. Soc. C.E
BOWMAN & CONNOR
Consulting Municipal and Structural Engineer
Waterworks, Sewerage and Electric Plants
Concrete and Steel Bridges and Buildings
CEMENT TESTING
36 Toronto St. Toronto, Tel. Main 5724.
Branch Office, Berlin. Tel. 112B.

LEA & COFFIN
AND **H. S. FERGUSON,**
ENGINEERS
Water Supply, Sewerage, Water Power Development and Transmission, Steam Power Plants, Pulp and Paper Mills, Examinations and Reports.
Coristine Building, - Montreal

OXLEY & CHADWICK
Consulting and Contracting ENGINEERS
Structural Steel and Reinforced Concrete, Warehouses, Factories, Foundations and Bridges. Steel and Concrete designs prepared for Architects.
Tel. M. 5958, 77 Victoria St., Toronto

CAMERON SEPTIC TANK Co.
CONSULTING ENGINEERS
Sewage Disposal
MONADNOCK BLOCK, CHICAGO, Ill.
NEW YORK 143 Liberty Street.
SAN FRANCISCO 528 Monadnock Bldg.

A. & E. LOIGNON, C. E.
17 Place d'Armes Hill, Montreal
Reinforced Concrete Constructions, Fireproof Warehouses, Factories, Etc., Steel Structures, Water Power.
Designs and Superintendence of Work.

J. STANLEY RICHMOND
CONSULTING ENGINEER
Power Plants and Expert Electrical Questions; City and Suburban Railways; Iron, Steel, Fuel and Gas Chemistry; Mechanical and Mining Engineering; Factory Systemization; Building Materials.
34 VICTORIA STREET, TORONTO
TEL. MAIN 5140. CABLE ADDRESS "TROLLEY

WILLIS CHIPMAN
Hon. Grad. Engineering, McGill University; M. Can. Soc. C.E., M. Am. Soc. C.E.; M. Am. Water Works Association
Water Works, Sewerage Works, Gas Works.
Electric Light and Power Plants.
Reports, Surveys, Construction. Valuations
103 BAY ST., TORONTO

ANDREW F. MACALLUM, C. E.
Consulting and Constructing Engineer.
Steam and Electric Railways.
Hydraulic, Industrial and Mining Plants,
Rooms 612-14 CONTINENTAL LIFE
Tel. Main 4652. BLDG. TORONTO

J. M. SHANLY
M. CAN. SOC. C. E. M. AM. SOC. C. E.
CIVIL ENGINEER
Room 310, Board of Trade
MONTREAL
RAILWAYS, BRIDGES, FOUNDATIONS, HYDRAULIC WORKS

CLARKE & MONDS
Engineers and Contractors
TORONTO, ONT.

EDWARD B. MERRILL
B.A., B.A. Sc., Mem. Can. Soc. C.E. Mem. A.I.E.E.
ENGINEER
Power Developments and Transmission, Electric Lighting, Electric Railways, Municipal Engineering, Industrial Plants, Reports, Valuations, Etc.
LAWLOR BUILDING, TORONTO, AND 305 FORT ST., WINNIPEG.

SMITH, KERRY & CHACE
ENGINEERS
Hydraulic, Electric, Railway, Municipal, Industrial.
W.U. Code used. Cable Address "Smithco."
TORONTO WINNIPEG
Cecil B. Smith J. G. G. Kerry W. G. Chace.

C. J. FENSOM
B.A. Sc.
CONSULTING ENGINEER
Aberdeen Chambers, Toronto. PHONES { Res., N. 2967 / Office, M. 1923
Machinery designed, supervised, inspected and contracted for. Tests, Reports, Electric Light Plants, Power Plants, Pumping Plants.

Charles H. Mitchell
Percival H. Mitchell
Consulting and Supervising Engineers
Hydraulic, Steam and Electric Power Plants
Industrial, Electrical & Municipal Engineering
Traders Bank Building, Toronto

STEWART & McTAGGART
Engineers and Contractors
Bridges, Buildings, Hoisting, and Conveying Machinery, Manufacturing Plants
CONSULTATION AND CONSTRUCTION
67 Federal Life Bldg., Hamilton, Ont.

WALTER J. FRANCIS, C.E.
Consulting Engineer
SOVEREIGN BANK BUILDING
MONTREAL
MEMBER CANADIAN SOCIETY CIVIL ENGINEERS
MEMBER AMERICAN SOCIETY CIVIL ENGINEERS

WELLS & RAYMOND
CIVIL ENGINEERS
Sewers, Sewage Disposal, Pavements, etc.
Reinforced Concrete Structures of all kinds.
Bridges, Buildings, etc.
Designs prepared for Contractors, to comply with Architects' Specifications.
A. F. WELLS, B.A. Sc., O.L.S. Assoc. M. Can. Soc. C.E.
D. C. RAYMOND B.A. Sc. Assoc M. Can. Soc. C.E.
217 Stair Building — TORONTO
Phone M. 3056.

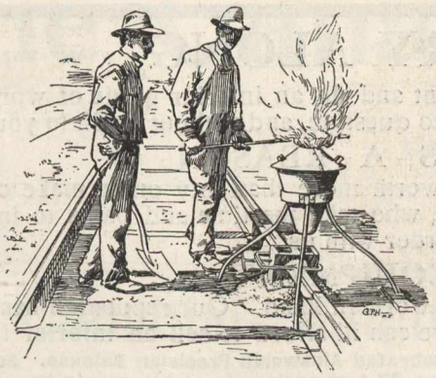
EDW. O. FUCE
Hon. Grad., Univ. Tor. (S.P.S.)
A. M. Can. Soc. C.E. Ont. Land Surveyor
CIVIL ENGINEER
GALT ONTARIO
REINFORCED CONCRETE STRUCTURES
SEWERAGE, SEWAGE DISPOSAL, WATER WORKS

HENRY N. NOLD
Consulting Electrical and Mechanical Engineer
Provident & Loan Chambers, Hamilton, Canada
Examinations, Estimates, Reports, Plans, Specifications and Supervision of Hydro-Electric Power Developments, Lighting, Railway Industrial and Power Installations, Power Transmission, Etc.

J. EDGAR PARSONS, B.A.
BARRISTER
Rooms 53 and 54 Canada Permanent Bldg.
18 Toronto St. - TORONTO
Tel. Main 2306

GALT & SMITH,
Consulting Engineers
Waterwork, sewerage and sewage disposal. Electric Lighting, steam and water powers, consultations, examinations and reports.
JOHN GALT, C. E. OWEN W. SMITH,
Mem. Can. Soc. C.E. Assoc. Mem, Can, Soc. C.E.
Office : 23 Jordan St. Toronto. Phone M. 3488.

YOUR NAME SHOULD BE HERE
(Send for Rates)



THERMIT RAIL JOINTS

The above illustration shows rail welding being carried on without interrupting traffic for more than a very few minutes. The appliances are light and portable and no outside power or construction cars are required. Joints give increased permanent electrical conductivity. State number of joints and number of the rail section to be welded and we will be pleased to estimate on the cost.

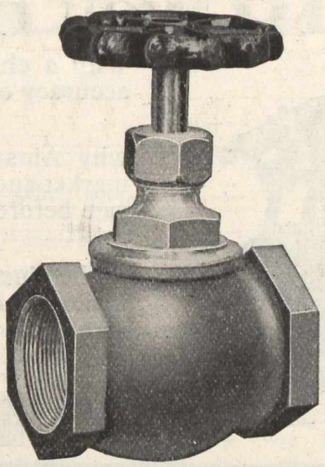
Write for Pamphlet No. 13-F

Goldschmidt Thermit Co.

103 Richmond St. W., Toronto, Ont.

General Offices: 90 West Street, New York

Pacific Coast Branch:
432-6 Folsom Street, San Francisco



More Money is Squandered

in the purchase of so called **"CHEAP"** Standard Globe Valves, than the average buyer has any conception of. They are the highest priced valves in the end.

ASK FOR KERR'S HIGH GRADE

Standard Globe Valve, and note the difference in service rendered for the little extra cost. You only pay for what you get.

The Kerr Engine Co., Ltd.

WALKERVILLE, ONT.

Makers of High Class Goods only

HARPELL-STOKES, Ltd.

Successors to

Filer & Harpell Co.

Electrical & Mechanical Apparatus

Electric Light & Power Plants

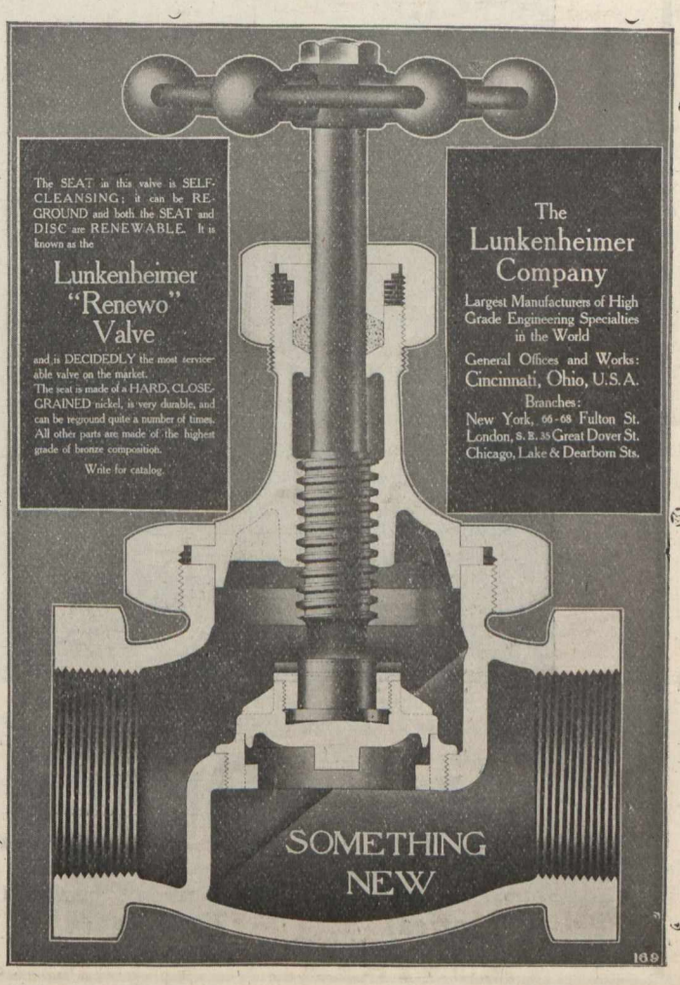
Elevators, Passenger & Freight

For Office Buildings, Stores, Warehouses, Factories, Hotels and Private Residences

Electric, Hydraulic, Steam or Hand Power

Head Office: 312 Donald St. WINNIPEG, MAN.

TORONTO	EDMONTON	VANCOUVER
155 King St. West	Box 1406	606 Granville St



The Canadian Engineer

WEEKLY

ESTABLISHED 1893

VOL. 16. TORONTO, CANADA, FEBRUARY 5th, 1909. No. 6

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

Terms of Subscription, payable in advance:

Canada and Great Britain:		United States and other Countries:	
One Year - -	$2.00	One Year - -	$2.50
Six Months - -	1.25	Six Months - -	1.50
Three Months -	0.75	Three Months -	1.00

ADVERTISEMENT RATES ON APPLICATION.

HEAD OFFICE: 62 Church Street, and Court Street, Toronto
TELEPHONE, Main 7404.

Montreal Office: B32, Board of Trade Building. T. C. Allum, Business and Editorial Representative, Phone M 2797.

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

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 5, 1909.

CONTENTS OF THIS ISSUE.

We will give a month's extension of subscription for a copy of the Canadian Engineer of Nov. 20th, 1908. If you do not file yours, we should be glad to have it.

GEO. A. MOUNTAIN—HIS OPPORTUNITY.

To be singled out from among thousands and selected as a leader is no small honor. To be so selected, as George A. Mountain was, without either courting the position or desiring the preferment, makes the tribute the more attractive; and to know that his co-workers and fellow-members were pleased to so select magnifies the office.

For thirty years engaged in engineering, and, since its inception, an active member of the Canadian Society of Civil Engineers, Mr. Mountain has much in common with the profession and the Society. His long years of training as a constructionist have developed a man who builds to conclusions solidly; a man never desiring comfort and luxury, but ever ready to prepare by patient reflecion for the single and simple duty which lay before him. He never did shun toil or fatigue in prosecuting difficult undertakings, nor would he recognize defeat in disappointment. These last four years of work have tried him out, and proven him an uncommonly able and forceful man, keen of brain and true of character, holding with intelligence a true balance between the contending forces that play and scheme and bully their opponents before the Railway Board of Canada. Whether the proceedings are intolerably dull or extremely contentious, Mr. Moutain is keenly interested, yet preserving a clear view and judicious tone towards the whole matter.

It is fortunate that the Canadian Society of Civil Engineers has at this period in its growth secured a man of Mr. Mountain's location, temperament, and sympathies at its President. The past, with its provincialism and sectionalism, must be outlived, and a Canadian organization, national in character, aim and outlook, must grow and increase in influence and be recognized as of high standing. This will come in two ways. Directly, by the firm stand taken on matters of policy and administration by the Executive and its leader, and indirectly by the status held in the community by the membership.

To reconcile diversified views, to encourage local branches, and yet prevent decentralization; to make the Society not only the recorder of facts, but the propagator of clear, bright ideas; to give service to the men in the far east and the far west, and join them with their brethren of the great middle country, this is Mr. Mountain's task for 1909, and his solution of it will be worked out in his own way, never wavering from his understanding of the complex problem.

CANADIAN RAILWAYS.

Canada's great problem to-day is transportation. On its solution depends the commercial standing and the social well-being of the nation. The necessity and possibilities of water transportation are great, but in Canada our transportation problems will be largely solved by the network of steel which is being rapidly spread over the country. Long wagon hauls are being eliminated, new country is being opened, and the railway, instead of waiting for the settler to open up the country, is itself the pioneer.

During 1908 there was added to the steam roads some 1,250 miles of track, while the mileage of electric

lines was increased by 160. Canada, with her 24,000 miles of steam railway track and 1,000 miles of electric line, is better supplied with railway facilities per unit of population than any other country. But the end is not yet.

The need and the opportunities for new lines and enlarged systems is well recognized by both railway promoters and investors, and, judging from the applications to Parliament, the record for the year 1909 promises to exceed that of last year. There is under construction 5,000 miles of steam road which will be completed this year. At least three Canadian cities will, during 1909, install street railway systems, while the extension of electric lines now in operation will be large.

From one end of the Grand Trunk Pacific to the other large forces will be employed during 1909, and, while certain sections will be near completion, other stretches will just be opening up. Following the completion of sections of the main line, feeders will be built and not during this year will these be completed.

The Canadian Pacific, besides their grade revision through the Rockies and along the Crow's Nest Pass Railway, are, in Western Canada, planning for extensions some 400 miles in length. Besides reaching new areas, they will bind together more completely the ribbons of steel already decorating the Western plain. In the East little promise is given of new work, although much is expected.

The Canadian Northern are expected to carry along large extensions in the West. Alberta and Saskatchewan, in their anxiety for increased railway facilities, have entered into an agreement with respect to bonds that will ensure the building of at least a thousand miles of new line in the wheat belt. Already the company have filed plans for a line to connect their Port Arthur terminus with their line near Sudbury.

With two new transcontinental roads the lines connecting Eastern and Western Canada will be strengthened. The volume of trade between the older Provinces and the new will increase and all Canada will be brought closer together.

EDITORIAL NOTES.

The Public Accounts of Canada show that in the year ending March 31, 1908, the Government railways cost to operate $79,244 more than they earned, the net earnings of $16,123 on the Intercolonial being more than offset by the loss of $95,367 in working the Prince Edward Island line. The earnings and expenditure of the Intercolonial are given as follows: Revenue, $9,173,558; working expenses, $9,157,435; net earnings, $16,123. The figures for the Prince Edward Island Railway are: Revenue, $304,579; working expenses, $399,947; deficit, $95,367.

* * * *

The Canadian Trade Commissioners are becoming more valuable yearly to Canadian merchants and business men. Mr. W. A. MacKinnon, the Canadian Trade Commissioner at Bristol, Eng., takes a wider interest than that of business only, and in his reports frequently deals with problems of interest to the engineer. Before the British papers had announced the report of the Royal Commission of Sewage he had reviewed it in his letter, and in a more recent letter he deals with a report from Italy on ferro-concrete, the Municipal Tramways Association's report and a report on Street Railway Accidents. Gradually the service these Commissioners are doing Canada is being recognized and appreciated.

* * * *

The system of instruction in industrial art adopted long ago by the Council of Arts and Manufactures of the Province of Quebec is bearing good fruit. Many of the pupils of the last twenty years are now successful artisans. There are this winter session 1,550 pupils being taught in the various classes in Montreal alone without charge. Schools of a like kind are open and well attended in Quebec, Fraserville, Three Rivers, St. Hyacinthe, Sherbrooke, Sorel, St. Johns, Valleyfield and Lachine. Plumbing is taught in one place in Montreal, mechanical drawing at another, and instruction in machinery is given at the Angus shops. At the building on St. Lawrence Main Street, called the Monument Nationale, classes in the following are held twice a week: Freehand drawing, painting, lithography, modelling, sign painting, lettering, boot and shoe pattern making, carpentry and stair building, architectural drawing, mechanical drawing, ladies' dress cutting, sewing and millinery.

COMING MEETINGS OF ENGINEERING SOCIETIES.

Association of Ontario Land Surveyors.—February 23, 24, 25, 1909, Annual Meeting, Parliament Buildings, Toronto Killaly Gamble, secretary-treasurer, 703 Temple Building, Toronto.

Canadian Forestry Association.—Annual Meeting, February 11-12, 1909, Convocation Hall, University of Toronto. Secretary, A. H. D. Ross, Faculty of Education, University of Toronto, Toronto.

Canadian Cement and Concrete Association.—First Annual Convention and Exhibition, March 1-6, 1909, St. Lawrence Arena, Toronto. Secretary, A. E. Uren, 62 Church Street, Toronto. Manager of Exhibition, R. M. Jaffray, 1 Wellington Street West, Toronto.

Canadian Mining Institute.—March 3-5, 1909, annual general meeting, Windsor Hotel, Montreal. H. Mortimer-Lamb, secretary, Montreal.

Cement Products Exhibition Company.—February 18-24, 1909, second annual cement show, Coliseum, Chicago, Ill.

Dominion Land Surveyors.—February 23, 24, 25, 1909, annual meeting, Ottawa, Ont. T. Nash secretary.

Engineers' Club of Toronto.—February 11th—"The Grade Crossing Question." Paper by Mr. F. L. Somerville.

Northwestern Cement Products Association.—March 2-4, 1909, fifth annual convention, Minneapolis National Guard Armoury, Minneapolis, Minn.

Ontario Provincial Good Roads Association.—March 3, 4, 1909, Annual Meeting, County of York Municipal Hall, Adelaide Street, Toronto. J. E. Farewell, Secretary, Whitby, Ont.

Providence Association of Mechanical Engineers.—June 22, 1909, Annual Meeting. Secretary, T. M. Phetteplace.

RAILWAY EARNINGS AND STOCK QUOTATIONS

NAME OF COMPANY	Mileage Operated	Capital in Thousands	Par Value	EARNINGS Week ending Jan. 28		STOCK QUOTATIONS TORONTO				MONTREAL			
				1909	1908	Price Jan 30, '08	Price Jan. 21 '09	Price Jan 28 '09	Sales Week End'd Jan 28	Price Jan 30 '08	Price Jan. 21 '09	Price Jan. 28 09	Sales Week End'd Jan 28
Canadian Pacific Railway	8,920.6	$150,000	$100				175	172¾	481	149 150	177 176	173½ 173	1250
Canadian Northern Railway	2,986.9												
Grand Trunk Railway	3,568.7	226,000	100	834,208	859,355								
T. & N. O.	305	(Gov. Road)											
Montreal Street Railway	138.3	18,000	100	65,829	59,107					179¼ 179½	208 207	207 206	249
Toronto Street Railway	114	8,000	100	65.845	59,339	98 100	113 113¾	113	161	98¾ 99	113 112¾	112¾ 112½	873
Winnipeg Electric	70	6,000	100			140		159 157	122		159	158½ 156½	

CANADIAN SOCIETY OF CIVIL ENGINEERS.

Annual Meeting in Toronto, January 28th, 29th, and 30th, 1909.

The twenty-third annual meeting of the Society was held in Toronto on January 28th, 29th, and 30th, 1909. The attendance was large and representative and in every way the meeting was successful. The members of the Association are so widely scattered and the matters dealt with are of such importance that we have arranged to give an almost verbatim report of the regular meetings.

The President, Mr. John Galbraith, presided at all meetings, and in opening the meeting Thursday morning, spoke as follows:—

THE PRESIDENT: Gentlemen, before taking the Chair, I wish, as a citizen of Toronto to welcome you here. I hope that your experience of the meeting in Toronto this time will encourage you to come again. I know that the Toronto people will do all they can to make your visit enjoyable, and, speaking for our own people, I may say that we are very happy to have the meeting of the Canadian Society of Civil Engineers here. (Applause.)

The Minutes of the General Annual Meeting, held in Montreal, January 28th, 1908, were read by the Secretary and confirmed.

Moved by COLONEL ANDERSON, seconded by MR. MARCEAU, that the nomination of scrutineers be left in the hands of the Chairman.

The President nominated the following list of scrutineers:—

1. For the election of officers and members of Council:—
   - J. C. T. Crofts, Chairman.
   - S. Gagne.
   - A. F. Wells.
   - T. T. Black.
   - J. T. Farmer.
   - F. N. Rutherford.
2. Election of Nominating Committee:—
   - O. W. Smith, Chairman.
   - W. E. Douglas.
   - J. M. Oxley.
3. Amendments to by-laws:—
   - E. B. Merrill, Chairman.
   - A. C. D. Blanchard.
   - D. C. Raymond.

THE PRESIDENT: It will be necessary for these gentlemen to get to work as quickly as they can. Their reports must be in the hands of Council on Saturday morning at 10 o'clock. The next business is the reading of the report of Council.

Moved by COLONEL ANDERSON, seconded by MR. COSTE, that the Report as printed be taken as read and received.—Carried.

DISCUSSION OF THE REPORT.

THE PRESIDENT: May I say one word before the discussion? I would like every speaker on rising to announce his name distinctly for the benefit of the stenographer, in order that we may have an accurate report of the meeting.

MR. COUTLEE (Ottawa): Mr. Chairman, on page 6 of the Report there will be found a paragraph beginning, "The desirability of instituting some sort of insurance or benevolent fund for the benefit of members." "It was found that an insurance scheme would require special legislation, and that its success was doubtful. The establishment of a benevolent fund, formed along the lines of that of the Institution of Civil Engineers was thought to be practicable, and is recommended to the consideration of the incoming Council."

I presume that matter is now referred to the Council for 1909, and I would like to ask the members to do whatever they can towards this matter. We are quite a numerous body now—a membership of over 2,000, scattered throughout the Dominion. The development of the country is progressing rapidly, and engineers are taking a very great part in the development of the Dominion. I think that each member should give some attention personally to this matter and communicate to Council any scheme that he may have or know of as likely to further this object. I think it commends itself to everyone, and I merely draw attention to it in order to have, if possible, the active support of everyone in the Association.

MR. STEAD (Chatham, New Brunswick): I would ask whether it was found that special legislation is necessary? The plan I spoke of last year was that when a death occurred an assessment of fifty cents per member should be levied. Would that require special legislation? By such an assessment the sum of $1,000 would be secured.

MR. MURDOCH (St. John): May I ask if there is anyone present who can give us an outline of the method of the Institute of Civil Engineers of Great Britain? That is what is suggested here.

THE PRESIDENT: I think COLONEL ANDERSON is acquainted with that institution.

COLONEL ANDERSON: I am not acquainted with the method used in the Institute, but I think it is purely voluntary. It appears to me that in a society such as this it would be impossible for us to force a member to subscribe anything beyond his regular dues. An organization would be necessary as in the case of the Civil Service Association. Only those who contributed to that fund received any benefit from it. I do not think that this society, by legislating, could force its members to subscribe even fifty cents for each death. On the other hand, it is quite evident that it would be to the material benefit of the members if they voluntarily enrolled themselves in such an organization. If it were done the scale of fees should be graduated according to the standing of the members; that is, a member should pay more than a student, for instance.

THE PRESIDENT: If I may be allowed to say a word, my recollection of the method of the Institute is this: They have a benevolent fund which is entirely apart from the management of the Institute. The subscriptions are voluntary, and are not necessarily for the benefit of the subscribers. They are for the benefit of members who may need assistance. The Institute lends a room and office equipment and so on to those in charge of the benevolent fund, but exercises no control over it. They, however, publish their reports. It is entirely, as its name implies, a benevolent fund, for the use of indigent members. They have no such thing as an insurance fund of any kind whatever, and I do not know of any similar institution which has. As a general rule the numbers are too small for an actuary to draw any conclusion from. There being only two or three thousand people, the results would be very irregular and uncertain. However, I do not wish to present my own views; I merely desired to give some information about the Institute.

MR. HARKOM: Mr. President, it would seem to me that this Society would be assuming an onerous duty in attempting to distribute such a fund. At present there is no means of doing so, in my belief. The benevolent feature of the fund, as outlined by you, is one that appeals to me. I think the members of the Society would be willing to subscribe to a fund that was not for the benefit of subscribers only, and if formed I think the fund should be a benevolent fund. It has frequently occurred that gentlemen in the profession have met with misfortune and illness; in such a case assistance from the fund would be very well spent. I would suggest, sir, that the matter be referred to a special committee. The management of the fund would have to be the work of a special committee; the staff of the Society have enough work to do now.

MR. UNIACKE: Mr. President, this matter when boiled down would amount to nothing more nor less than fraternal assurance. These fraternal assurance companies, in opposition to the old line companies, depend for the most part on lapses and on sending out the drag-net to draw in as many new members as possible with a view of increasing the amount on deposit. We cannot do that if we wished to. Only men are admitted to this Society who are qualified to become members. I do not think the Society should become a benevolent institution, and before a committee is appointed to look into the matter I would suggest that anything in the line of benevolence should not enter into the discussion.

MR. STEAD: I would suggest that it be left over to the Saturday meeting.

THE PRESIDENT: We will defer, then, the question to Saturday's meeting to give the members time to think over it.

The report was then adopted on motion of the same gentlemen.

REPORT OF THE LIBRARY AND HOUSE COMMITTEE.

Moved by MR. J. A. JAMIESON, seconded by COLONEL ANDERSON, that the Report of the Library and House Committee be received.

There being no discussion, the Report was adopted on the motion of the same gentlemen.

TREASURER'S REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1908.

Moved by MR. ROBINSON, seconded by MR. ST. LAURENT, that the Treasurer's Report be received and adopted.—Carried.

THE PRESIDENT: Before proceeding with the reports of committees, it seems advisable, in order to save time, to take up matters that possibly may be less contentious meantime, and put the others a little latter. I shall now ask for the reports of the Toronto, Quebec and Winnipeg branches.

(The Report of the Toronto branch of the Society was read by Mr. C. H. Mitchell, who said: "The committee of the branch thought it wise to insert these recommendations in this Report to be sent to the parent Society in order that the information might be useful, possibly, to some of the other branches.)

MR. LEOFRED explained that the President and Secretary of the Quebec branch were unable to be present, but their report has been sent in, and he requested that it be read by the Secretary.

The Secretary read the Report of the Quebec branch.

THE PRESIDENT: There is no report from the Winnipeg branch. The question arises, What is to be done with these reports from the branches? They have, of course, been received, approved and adopted by the branches themselves. It does not necessarily follow that the Society is required to adopt them. As far as the information that is in them is concerned, the statistics, and so on, that would be quite proper, but there is a chance always of a section of the Society proposing something very radical which would possibly arouse a very great deal of discussion. I do not say that has been done in these reports, but I am speaking of the general method of handling reports from branches. If you think it best that a motion should be put to adopt these reports, that may mean a great deal of discussion on any radical or salient feature, if there is any, and may take up a good deal of time. Another way of treating them would be simply to receive them and have them forwarded to the incoming Council as matters for the consideration of the Council. In that way we would have the benefit of a long consideration of the whole thing, and possibly the Council might mature some new thing from the suggestions in these reports. I do not know how they have been dealt with in the past, whether any custom has been established. There is nothing in the by-laws to indicate, and I leave it now to the meeting.

MR. JAMIESON: Mr. President, although you have not a report from the Winnipeg branch, there is a member here, Mr. Schwitzer, and I think it would be interesting if he could tell us how they are progressing.

THE PRESIDENT: I will ask Mr. Schwitzer to give an informal verbal report.

MR. SCHWITZER: I understood, Mr. Chairman, that our Secretary had sent in a report, but if he did it has not yet reached you. We have done very little during the past year beyond organizing and getting into fair shape. We have had several well-attended meetings and an annual dinner, at which forty-five or fifty members were present. At first we had meetings every two weeks, afterwards changed to every month, at which informal discussions were held on some of the papers which were read. We are satisfied that the branch is going to be a success, and we are getting in all the engineers.

MR. MOUNTAIN: The dinner seems to have been the most important meeting.

MR. SCHWITZER: Yes; we had the biggest crowd there. One of the reports read this morning referred to funds for the Society. In addition to the refund from the parent Society we passed a resolution that all the members should pay the difference between the resident and non-resident dues at Montreal as a special contribution towards the branch. We found in the West a considerable feeling of liberty, a desire to cut loose from the parent Society and form a separate organization. I think we have killed that altogether. They feel out there that they are not particularly tied down to anything. The air of the West seems to breed that feeling.

Moved by MR. MURDOCH, seconded by MR. KENNEDY, that the reports of the branches be received, filed for reference, referred to the Council for consideration and printed in the proceedings of the annual meeting.—Carried.

THE PRESIDENT: This will be a proper time to introduce a matter connected with branches. A petition from Ottawa has just been laid on the table, which I shall read. It is addressed to the Council: "The undersigned members of the Canadian Society of Civil Engineers request the authority of Council for the formation of a branch of the Society in the city of Ottawa under the rules of the Society." (Applause.)

The report on students' prizes was read by the Secretary, who stated that in the General Section two papers are recommended for prizes; there being no provision for two prizes in one section, only one can be given unless the meeting should think fit, there being none awarded in the Mechanical Section, to apply that to the General.

Moved by MR. HARKOM, seconded by MR. MARCEAU, that the report on students' prizes be received and adopted, including the award of two prizes in the General Section.—Carried.

Moved by COLONEL ANDERSON, seconded by MR. MOUNTAIN, that the members assembled in annual meeting have learnt with regret of the loss by death during the past year of the following gentlemen connected with the Society, and desire to place on record their sympathy with the members of their respective families:—

Messrs.	George Holland	Member.
	Thomas E. Lamb.....	Associate Member.
	Grieve Macrone	Associate Member.
	Herbert L. Price.....	Student.
	Robert M. Pratt.....	Member.
	Duncan Sinclair	Associate Member.
	Sir Robert G. Reid.....	Associate Member.

That the Secretary be instructed to convey the substance of this resolution to the representatives of the deceased.

THE PRESIDENT: The next item is reports of the various committees of the Society. There are four reports: Establishment of Testing Laboratories; Usefulness of the Society; Transportation; Cement. Two of these reports you will find in the Annual Report. The other two are ready for distribution. On page 31 you will find the report of the Committee on the Establishment of Testing Laboratories.

Moved by MR. JAMIESON, seconded by MR. MOUNTAIN, that the report of the Committee on the Establishment of Testing Laboratories be adopted.

MR. JAMIESON: Mr. President, in reading the report as printed here it is left rather indefinite, I think, as to just what steps were recommended or as to who should take the matter up with the Government with this end in view. I think, although I am a member of that committee, that it would have been well to have had a special committee appointed for that, or let this committee do it, and then it would be the particular duty of those members to attend to it. Otherwise it is very apt to drag. I do not know whether Mr. Keefer is here to speak of that. It is an important subject, and should be dealt with promptly, and as full representation made to the Government as possible to aid, either in the establishment of a laboratory or assisting the universities.

THE PRESIDENT: If I may be allowed to say a word in connection with this report—I was one of the members of the committee—the question raised by Mr. Jamieson as to how this matter may be forwarded, was felt to be a very important one, but one of the main difficulties in the way of this and other suggestions, one of the things that kills activity, is the fact that we ask our members to make expensive journeys to other places without offering them any remuneration. For instance, this report would require the committee to visit Ottawa. The work of the committee is arduous and there is very little glory in it, very little that they would be willing to pay for and they receive, possibly, nothing but criticism. (Hear, hear.) I do not think we shall ever have satisfaction until we are prepared to pay at least travelling expenses. I just interject that as germane to this report.

MR. JAMIESON: As the President has said, the time and expense imposed on members of the committee is often a hardship. It would be very desirable if they could be reimbursed for their outlay, and I think the Society is now in a good enough financial position to stand that. If they wish certain work done, and the members give their time free, they might at least be reimbursed for their outlay. If anything of that kind can be done, perhaps it would be best for the Council to do it.

MR. LEOFRED: Mr. Chairman, I quite approve of the idea of paying the expenses of the members who devote their time to the hard work of the committees. We have but a small committee in Quebec, but its work involves a great deal of expense and loss of time. We have members spending about $75 to come to this

Toronto meeting, besides the loss of one week of their time. I give that merely as an example. I would be quite willing, not only to vote for the payment of travelling expenses, but I think the time of those committees should also be paid for. I do not know whether the Society has the means to do it, but I think it would be just. The loss of time may mean $50 or perhaps more per day, and that is enough without asking the member to pay his expenses as well.

MR. L. W. GILL: Mr. Chairman, we depend very largely upon the Council to look after the affairs of the Society. Under by-law 32, on page 10, it is only necessary for the Council to recommend an appropriation, and I have no doubt the members would approve of providing funds for a committee to carry out its appointed work.

THE PRESIDENT: If the meeting is in accord I think it would be well to make it more specific than suggested by Mr. Gill. If a motion were passed instructing Council or suggesting the advisability of reimbursing members on certain committees, or on all committees as they may see fit, for their out-of-pocket expenses, that would have more weight with the incoming Council than to leave them without instructions.

MR. JAMIESON: If you will pardon me, Mr. President, for speaking again on this subject, I think a great deal of care must be exercised or we may run into considerable expense. I would be opposed to reimbursing the members for their time. I think all members of the Society will do the work involved in committees without any hope of being directly reimbursed. Proper care should be used in calling meetings, so that they shall not be too expensive. Most of our meetings on committee have been in Montreal, and therefore the Montreal members are certainly not requiring reimbursement; but we appoint our committees from members residing all over the country, and that makes it difficult to get a meeting. I have found it particularly so this year. It is in the right direction at least to reimburse, within a limited measure, certain expenditures.

MR. O'SULLIVAN: I am in agreement with the gentleman who has spoken last, that I would not uphold paying for the time; but I consider it only fair that when delegates are sent to Ottawa or wherever necessary, that they should be paid their disbursements. The disbursements should be approved by the local Council, and submitted to the head Society for payment.

MR. LEONARD: A large number of the members of the Society are in the employ of the different railways, and as these railways benefit indirectly by their employees belonging to such an institution, would it not be worth while to see if some concession—perhaps not free passes—in the way of railway rates might not be granted. For instance in such a case as a delegation being sent to Ottawa.

MR. CONDY: I agree with Mr. Gill that the matter is fairly provided for in the by-laws, and that it would be safe to leave it as it stands, with the Committees and the Council; each committee feeling the necessity for a grant to make application to Council and be dealt with in that way; each case dealt with on its own merits, rather than that we should pass any general resolution.

MR. J. H. HUNTER: The remarks of Mr. Gill and Mr. Condy have covered the point, but I do not see why the Society should shirk its responsibilities. Whenever there is a new departure in anything like expenditure, the Council or anybody else who inaugurates that is usually called to account at the Annual Meeting for the departure from the general principles by which it has hitherto been guided. I think it is perfectly safe to leave it in the hands of the Executive Committee or Council to decide what shall be legitimate expenses, and what should or should not be paid. But I do not see why we should not supplement that by a motion now sanctioning anything they might do in that regard. It would put the Executive Committee on a much easier footing than it is to-day; they have enough to trouble them without adding anything more to their burdens.

MR. GILL: We must look at the by-laws again, Mr. President, otherwise we may adopt a motion in conflict with them. The suggestion as to reduced railway fares is well worth considering, but there are other necessary expenses in connection with the work of committees, and all of these are provided for in the same by-law. It would not do to pass a motion, as suggested by the last speaker, because this by-law states that in no case shall Council incur any expenditure for extraordinary purposes unless previously authorized to do so at the Annual Meeting or at a special General Meeting, and Council must recommend that these grants shall be made for any special purpose. That, I think, covers the point brought up.

MR. HUNTER: Is not that the very reason why Council should be authorized to sanction this expenditure?

MR. J. S. ARMSTRONG: I would move that the payment of travelling expenses and other expenses which the Council may deem proper, be ordinary expenses and be under the jurisdiction of the Council.

MR. LEOFRED: I am of the opinion that this is not included in extraordinary expenses, as my friend Gill seems to think. It is not an extraordinary purpose; it is the ordinary work of the Society. We should therefore, I think, pass a resolution that Council deal with the matter at discretion.

MR. HARKOM: Are we not drifting into a revision of the by-laws? The Society is willing to deal fairly and liberally with recommendations of the Council on the subject of appropriations of that kind made during the previous year. Our constitution will not permit us to change the by-laws by a simple resolution.

MR. GILL: I did not say this would be extraordinary expenditure. The by-laws says any specific purpose, ordinary or extraordinary. It covers both.

MR. LEONARD: Any man who is appointed a delegate to expend money for the purposes of any employer, looks to that employer for the money he has expended. The out-of-pocket expenses of a member of a committee should certainly, I think, be considered ordinary expenses under the by-law as quoted. I have pleasure in seconding Mr. Armstrong's motion that the out-of-pocket expenses of delegates of this Society when sent on the Society's business, should be considered ordinary expenses.

THE PRESIDENT: If I may be allowed to interject once more; as there seems to be some doubt whether we may not be interfering with the by-laws, would it not be better, instead of putting the motion, to refer the whole matter to a committee of the Society to report on Saturday morning?

DR. DAWSON (Ottawa): May I ask that these motions be made a little more clear as to their scope? It is proposed that the travelling expenses of members of Council be paid for every Council meeting? Or only committees or only special delegations? Again it might be well to place a limit on the total expenditure that Council would be authorized to make, so many hundred or a thousand dollars per annum for these purposes. If the expenses exceeded the amount named, then it should be distributed pro rata. We should define exactly what expenses it is contemplated to pay. I mention this in order that those supporting the motion may make the explanation.

J. G. KERRY: I think, Mr. President, we are talking about something that we do not, perhaps, know very much about. I would be glad if the Chair would explain to what extent the Council has power to pay such expenses. In other words, what formal procedure is necessary to deal with these questions. I think we are all rather at sea as to that.

THE PRESIDENT: There are two by-laws which refer to the matter, one the by-law quoted by Mr. Gill, No. 32, and the other by-law 47. (Reads these by-laws.) I think No. 47 refers to the second part of No. 32; that is to say, the expenditure for extraordinary circumstances. I am not aware of any other by-laws touching the subject; I think these are the only two.

MR. ARMSTRONG: I am quite willing to withdraw my resolution and move that the Chairman appoint a committee to consider the matter. (Applause.)

MR. KERRY: I think the objection is sound that no motion of any kind is required. Do you understand, sir, that the payment of these expenses is the payment of the ordinary working expenses of the Society? Do you understand that no special vote is required in a matter of this kind? It would appear to me not. I am asking the Chair for an interpretation of that by-law.

THE PRESIDENT: From the fact that we are discussing it and from the fact that we have never paid expenses, it is apparent that the Society is not agreed that it is an ordinary expenditure. If we had been in the habit of paying these things without discussion, then we would have considered it an ordinary thing, and no discussion would have occurred. The fact is that we have not done

it, and we have been afraid to do it, and we are now considering it. That indicates, to my mind, that this sort of expenditure is not "ordinary." Most of us believe that it should be ordinary expenditure, but I do not think we can interpret it as such under present conditions. (Applause.)

COLONEL ANDERSON: I dissent, Mr. Chairman, from what has been said this morning with regard to paying the expenses of either committees or delegates. In my opinion the idea of the Society is that it shall be worked from headquarters. The innovation of holding the Annual Meeting at different cities I consider a good one and one that is likely to give us the representative views of different centres of Canada. I think there has been no fault to find with the way in which the Society has been managed in the city of Montreal in the past. (Hear, hear.) Consequently, I see no reason for departing from our past policy of asking for the gratuitous services of our Council and membership committees. It is quite true that it may be just to pay these expenses, but if you admit the principle, where shall we stop? If a man coming from Toronto to Montreal has a right of his expenses, has not the man from Victoria exactly the same right? and will he not seek to enforce it? If we begin paying the expense of working the Society it will open a door that there will be no closing, and will take away any profit we might expect to make from the membership fees. I contend that, in the interest of the Society, matters should be left as they are. In many cases members of our Council are connected with railway corporations, and as such have free transportation, so that the burden on them is not a grievous one. When, as a member of Council, and as President, I went from Ottawa to Montreal to attend meetings, one grievance I had was that the Society itself charged me for the room I occupied at its offices. That I thought was a little ungenerous, but I do not think many of the members who are sufficiently prominent to be put on committees grudge the expense that they are out of pocket in attending meetings. Another thing is that with our system of branches as organized and now extending, it should be fairly easy to get an expression of opinion from the different centres without the expense of sending men to headquarters or to Ottawa. If delegations are required to present petitions or resolutions of the Society to the Government, surely there are enough men in Ottawa either in or outside the Government service to represent the Society. It would be reasonable in matters of that kind to appoint men who are at the centre, where the work is required and in that way obviate unnecessary expense. (Applause.)

MR. HUNTER: I think we are getting far from the subject of testing laboratories. Would it not be as well to act on the suggestion that a committee be appointed to consider it?

THE PRESIDENT: Are you satisfied with the suggestion that a committee be named by the Chair to report on this subject before the end of the meeting?—Carried.

THE PRESIDENT: This part of the discussion applies to all reports of committees which necessitate people travelling out of town, so that we need not refer to that portion again.

MR. LEOFRED: Does that include branches as well as the parent Society?

THE PRESIDENT: I do not think the branches appoint committees of this kind. I should say not; I should say it referred only to the action of the main Society.

THE PRESIDENT: Then as to the first report on Establishment of Testing Laboratories, what shall be done with it? The motion to adopt is carried.

MR. DION: I ask for information, what is going to be the effect of this motion? The report is adopted and this report suggests that the Government be approached and asked to do something. Is the effect of adopting the report to be that it is simply filed, or is the Executive Committee going to take some action to approach the Government as recommended by the report? If a deputation is to be appointed should not this meeting appoint it or assist you to do so. The adoption of the report should not shelve the matter.

THE PRESIDENT: I think we can act on this altogether aside from the question of paying expenses. I think the incoming Council may be asked to take action.

MR. JAMIESON: It is a matter for the meeting and not for the Council. That is the point I raised on this motion. I would be in favour of the present committee; they should not be allowed to shift their responsibility to someone else. There is a committee, of which Mr. Keefer is chairman, and they have not dealt fully with the work for which they were appointed. I think they have power to add to their numbers.

MR. MURDOCH: I second Mr. Jamieson's motion.

THE PRESIDENT: Then it is moved by Mr. Jamieson, seconded by Mr. Murdoch, that this committee be continued with power to add to its numbers, and that it proceed to carry out its suggestions. —Carried.

MR. KERRY: May I ask for another interpretation, Mr. Chairman? Is this committee absolutely independent to take action without reference to the general management of the Society? Is that the meaning of the motion that has just been passed?

THE PRESIDENT: I should say so. I think that is what it means.

MR. MURDOCH: It is only to argue with the Government; they cannot pass any laws.

THE PRESIDENT: The meaning of it is that we agree to the principles of this report, and that we are ready to ask that committee to go on.

MR. KERRY: Should there not be some defined communication constantly between that committee and the Council? Are we not asking the committee to take action outside the Society and to more or less take a position for and commit the Society?

THE PRESIDENT: It is doing that.

MR. KERRY: Then should not the committee be instructed to consult Council before it takes any particular action on behalf of the Society? We cannot risk having more than one executive and representative. As I understand the motion there is practically no limit to the power of this committee to act.

THE PRESIDENT: Except as contained in the report.

MR. COSTE: I do not think the Society should delegate power to a committee to represent the Society before the Government or any other body. The duty of the committee simply is to report to Council. When a report is adopted then it is the duty of Council to carry out the recommendations of the committee. I do not think it would be wise or diplomatic to approach a Government through a committee, however wisely selected. In a matter of this kind the Government should be approached with the full authority of the Society as represented by its President and Council.

MR. STECKEL: The Government is spending quite a sum of money to improve their own laboratory, so it is hardly probable that they will spend anything on this. They might be willing to leave the matter in the hands of the universities.

THE PRESIDENT: I may say, as I have personal knowledge of matters Mr. Steckel is speaking of, that he has taken a wrong meaning from the report. The committee looked into the work of the Government laboratory pretty thoroughly, and it is altogether aside from the work refered to in the report. It is not suggested here that any tests be made of materials for the purpose of seeing that they comply with certain specifications for work. It is investigation along the line of the United States Geological Survey, or at least one of its departments, as the report says, to investigate the properties of all materials of engineering interest. It is not investigation along the line of the work of the Watertown Arsenal, and that is largely the work that is being done at Ottawa.

With regard to the other point, we have already passed a resolution authorizing the committee to go on, and we are having a further discussion upon it. To be in order, it would be well to have a supplementary resolution instructing the committee to communicate with Council or something of that kind.

MR. JAMIESON: The intention is that the committees shall be in touch with the Council but not throw their duties on the Council. I do not think any committee will act independently of the Council and officers of the Society.

MR. KERRY: I would suggest that Mr. Coste be asked to draft a resolution covering this matter so as to give the meeting a clear understanding of it.

(At 12.30 adjourned to 3 o'clock).

AFTERNOON SESSION.

Thursday, 28th January, 1909.

THE PRESIDENT: I was asked to name a committee to consider the question of out-of-pocket expenses, and I have chosen the following:—

Messrs. W. P. Anderson, Ottawa.
W. Murdoch, St. John.
J. A. Jamieson, Montreal.
J. E. Schwitzer.
C. H. Rust, Toronto.
A. Leofred, Quebec.
J. G. G. Kerry, Campbellford.

MR. COSTE: Mr. President, before lunch the question of the report of the committee on the Establishment of Testing Laboratories came before the meeting and I understand that a resolution was carried settling the matter; that is continuing the committee in existence and giving it power to carry out its own recommendation. At the time I did not understand that the motion went as far as that. I thought the continuance of the committee was purely and simply for the purpose of continuing their work of suggesting to the Society the best possible methods to establish these laboratories. It appears that the motion has gone further and that now the committee in question is empowered to actually carry out its own recommendations, that is to approach the Dominion Government with a view to obtaining assistance for the creation of these laboratories. I do not believe that that is the proper step to take and I would like the Society to reconsider its action. I would like to offer a motion of a somewhat different nature. With my knowledge of affairs in Ottawa I do not believe that a committee of the Society would have as great an influence as the President and Council. Furthermore, I do not believe that a committee making a recommendation to a Society should be instructed to carry its own recommendation into effect. That should be the work of the people to whom they report.

MR. JAMIESON: I think that Mr. Coste is probably under a wrong impression. I think the general idea is that all committees act in connection with the Council and not as independent bodies. I do not think any committee will act independently, but if deputized by the meeting to interview the Government or anyone else they will go as full representatives of the Society, with the whole prestige of the Society behind them. They do not go as individuals.

THE PRESIDENT: Would it meet your view, Mr. Coste, if there should be an understanding with the committee that the President and Secretary of the Society be added?

MR. COSTE: No, Mr. Chairman. I think the principle is vicious. I am speaking generally, of course. The principle of deputing men who have reported upon a certain thing, to act as ambassadors with others, is wrong. So important a question as this should be dealt with by the Executive Council itself, with its full power. It should get its strongest men to make these representations, and surely the Society will grant that no committee would have the power and authority of the President of the Society flanked by his Council. I move that the motion in connection with the report of the Committee on the Establishment of Test Laboratories be rescinded and that the discussion upon the subject be allowed to continue.

MR. KERRY: I have pleasure in seconding that motion, Mr. Chairman.

THE PRESIDENT: It is moved by Mr. Coste, seconded by Mr. Kerry, that the motion adopting the report of the Committee on the Establishment of Testing Laboratories be rescinded and that the discussion thereon proceed.

MR. LEGRAND: This motion is out of order completely, because the committee must always report to their Council in any Society.

THE PRESIDENT: The committee has reported to the Council and it is the motion adopting the report that is asked to be rescinded.

MR. JAMIESON: May we have the motion as it stood read? It is not the intention that the committee should, right off the reel, go and interview the Government.

MR. KERRY: I would consider, Mr. President, that the committee has absolute power to act within the limits of the Society, but not outside or to deal with people not directly connected with the Society. In public matters the Council or its committee is the proper body to transact business and to represent the Society publicly. That is the issue. We are one corporate body and we want to establish ourselves in the respect and confidence of the public. Therefore, we must be exceedingly careful in every public matter we undertake. I do not know any better way to provide for that than to entrust such duties to the President and Council.

MR. COUTLEE: I think it is a question whether or not this committee is to be given unlimited power. Any negotiations which they may have are subject to the revision of the Society as a whole before anything binding is done. Any agreement would be signed by the officers of the Society. It is not a question of rescinding this resolution but of limiting the powers of the committee.

THE SECRETARY: The resolution was, "Moved by Mr. Jamieson, seconded by Mr. Murdoch, that the report be adopted and the committee be continued with power to add to its numbers and that it proceed to carry out its suggestion."

MR. JAMIESON: That would be through the Council. There is nothing there to say they could act independently of the Society.

MR. COUTLEE: I do not think a representation from the whole Society or a committee will gain the end of a national laboratory at once. That is a thing that the public will have to be educated to for years. The work will not be accomplished in its present shape. The committee should get into a fairly digested form their idea of what a national laboratory should be. Then they could speak to various people and gradually bring the matter before the Government in that way. They should make the thing concrete.

MR. COSTE: If the resolution is simply to continue the committee in the work they have been doing in the past, I am in favor of it; but the resolution goes further than that. The recommendation is specific that the Dominion Government be approached with reference to the establishment of the department in question. Now, I say, who are the proper people to approach the Government on behalf of this Society? Surely not the committee who made the report. The Executive of the Society should take upon itself to lay before the Government the suggestions of the committee. It should do so through its chief executive officers and that is the point I make.

THE PRESIDENT: The recommendations of the committee are that the Dominion Government be approached with reference to the establishment of so and so, and also that possibly arrangements might be made by the Government with the universities. These are recommendations of action to be taken. It seems to me that the Society may adopt that report in full as it is, and without proceeding to act according to these recommendations immediately, it may ask the committee to continue the work of gathering further information. For instance, investigating the work of the Research Department of the United States Geological Survey. Getting more information so that the Society, or if you like, the Council, may take action afterwards. The question of acting through the Council that has been brought up by Mr. Coste is a very material thing; but the whole report as it is given here can be adopted without affecting either view. The report having been adopted the next question is whether you shall appoint a committee to approach the Government, or shall you appoint a committee to get further information on Research Laboratories? It is one of these questions.

MR. JAMIESON: Mr. President, I would like to make that clear. The point I raised when the motion was made was, that we were practically no further ahead than when we started; that is the report does not go sufficiently far; no line of action is shown, and no basis on which a laboratory should be established by the Government or how they should assist. That should be fully digested before anyone approaches the Government. It is only a matter of continuing the work; there is no question yet of actually approaching the Government.

MR. MOUNTAIN: The last paragraph of the resolution then should be rescinded.

MR. COSTE: If that is the scope of the resolution I have nothing more to say, but I claim that it empowers the committee to approach the Government and to that I strongly object. That is, in a nutshell, my position.

THE PRESIDENT: Perhaps Mr. Jamieson would modify the last portion of this motion, to meet Mr. Coste's views.

MR. LEOFRED: Mr. Chairman, it seems to me that it is not very flattering for the meeting to tell the committee to continue their work. That would show a want of confidence. They have come to the conclusion that it would be necessary or advisable to approach the Dominion Government with a view to the establishment of a national laboratory of research. Are we to tell them

that they have reached their conclusion too quickly and should go back to their work and go on with it?

MR. MURDOCH: Should not that request come from a member of the committee? If they ask an extension of time to continue their work, to grant that request would not show a want of confidence; to refuse their request would be a want of confidence.

MR. LEOFRED: If they wish for more time to come to a conclusion they should have asked for it in their report. They have not asked for it.

THE PRESIDENT: My recollection of the discussion which crystallized in this report is that the intention was simply a recommendation to the in-coming Council. There is nothing in their report to prevent it being considered in that way. Or it may be considered a report for action by the Society assembled in Annual Meeting. I suppose it must be taken as the latter, a report to the Annual Meeting, but I think the committee was also thinking of it as a recommendation to Council.

MR. MURDOCH: It was in deference to the request of Mr. Jamieson, a member of the committee, that the life of the committee was extended, with power to still further investigate and report.

THE PRESIDENT: The point I was trying to clear up was this; Mr. Coste thinks the Council through its officers is the proper body to act. Now I do not think we can get the Council to act unless we instruct them or make this recommendation to the Council. If we do not do that, we simply give instructions to one of our own committees which may or may not act through the Council, which may do just as it pleases. Do you want to leave the whole matter with the Council or do you want to give instructions yourselves to one of your own committees as to what is to be done?

MR. ARMSTRONG: Should we not open the question in the regular way and reconsider the matter so that an amendment may be made? Is it before the meeting at present? We have nothing to discuss; we cannot amend until we can reconsider.

THE PRESIDENT: I think you must have been out of the room, Mr. Armstrong. The meeting decided by motion to rescind their previous action and now a motion is before the meeting by Mr. Coste, seconded by Mr. Kerry. That action has been taken.

MR. J. M. MORRIS: I think all we should do is to refer this to the Council, asking them to proceed to secure further information through this or some other committee which they may appoint.

MR. JAMIESON: We do not want to load down the Council with committee work. Let the committees that are appointed for certain purposes carry out their work and then make their recommendations to Council and work with the Council in such matters as this.

MR. COSTE: No one has any objection to that and if a proper resolution is put I am willing to accept it. I have not the slightest objection to the present committee; what I object to is that once they have made their recommendation or suggestion to the Society that they should be authorized to carry it out. I would like to know whether a motion is now in order, or whether the motion made by Mr. Jamieson has been rescinded?

THE PRESIDENT: That motion has been carried.

MR. COSTE: Then I am in order if I move a resolution. If action is to be taken on the report of the committee, I think that action should be taken by the Council and not by the committee; but I will give precedence to anyone who desires to move simply to continue this committee in office in order to make a report which will be considered by Council and eventually by the Society.

THE PRESIDENT: I think a motion of that kind is perfectly in order.

MR. COSTE: Then I preface it by saying that whereas the Committee on the Establishment of Testing Laboratories has, in its report of January 9th, 1909, recommended that the Dominion Government be approached with reference to the establishment of a department of research, similar to that lately established by the American Government under the United States Geological Surveys, in order to investigate the properties of all materials of engineering interest, whether in the raw or in the manufactured form; and whereas the report of that committee has been adopted by the Annual Meeting of the Society; then I beg to move, seconded by Mr. Kerry, that the Council of the Society be instructed to carry out the recommendation of the said committee and to take steps to approach the Dominion Government through the good offices of its President and the members of Council. My motion is specific, sir, because I contend that the recommendation made by the committee on the Establishment of a Testing Laboratory is a specific recommendation. Now, who is to carry out the recommendation of this Society made through one of its committees if not Council, and why should Council delegate to anyone outside of its membership, that is outside of the Council, this important work of negotiating with another body? If our Council is elected for any purpose, it must be for purposes of this kind. That is to carry out the work suggested by its members through committee or in any other way. I hope I made myself perfectly clear. I have not the slightest objection that the committee should be continued in office to do other work which I believe, as Mr. Jamieson has said, is necessary.

THE PRESIDENT: If the meeting decides to carry this motion, which means referring the whole matter to the Council, it had better not hamper the Council by continuing the old committee. It would be better to let that committee's work stand.

MR. COSTE: My motion is only made if the report is adopted.

THE PRESIDENT: The report is adopted.

MR. COSTE: Then we have had a recommendation made. If this recommendation is to be carried into effect, then it should be carried out by Council.

THE PRESIDENT: You ought not to put in that motion any recommendation that the committee be continued because that is conflicting with the other.

MR. COSTE: That is not in my motion.

MR. HUNTER: The report shows that the work is not yet complete. If you go to the Government and ask for a testing laboratory, you will be asked how much it will cost. Is the Council prepared to answer that question? Have they the time or information to prepare an answer?

THE PRESIDENT: They would appoint a committee to consider the thing and perhaps work six months or a year.

MR. HUNTER: Then why should not this committee continue its work? Why should you ask another man to educate himself on this subject sufficiently to make a recommendation to Council? I think the committee should be continued and report to the Council. Not that I think this organization is not perfectly justified in appointing a committee to do any kind of work. This organization makes the Council and if it appoints a committee it puts the two on the same footing, and probably the committee would be the best delegation you could have to approach the Government. But I do not press that. I think the committee should be continued and should report to the Council, and the Council with the material in hand could then go to the Government as an intelligent body of men and tell them just what they want.

THE PRESIDENT: The Council would still require instructions from the meeting.

MR. HUNTER: One year has gone and nothing done. Are we to lose another year?

MR. ARMSTRONG: How would this do? That the committee be continued with power to add to their number and that when they have a specific scheme in form the Council be authorized to approach the Government taking with them on their deputation such members as they may select. It is always an advantage to have a good large deputation in approaching the Government so as to make them hear you. My resolution provides that the committee shall work out a specific scheme and then the Council go before the Government.

MR. HUNTER: I second that amendment.

MR. LEOFRED: This committee was appointed about a year ago; its members have devoted their time, given hard work and long correspondence and neglected their own business to be useful to the Society. The only thanks they have to-day is to be told they have not done anything, that their report is no use whatever, that they should go and do something and report again to the meeting. That is a very fine way of thanking members of a committee. I am not personally acquainted with the members of the committee, but I am sorry that that is the only thanks they have from this meeting.

THE PRESIDENT: I am afraid Mr. Leofred has a very much higher opinion of that committee than any of its members. I can assure you, gentlemen, that the committee has not spent any money or very much time. (Laughter).

MR. JAMIESON: As a member of that committee I can pretty well agree with our President. While a considerable amount of investigation was done, unfortunately they left their meeting a little

late, and I have to plead guilty to not having been able to attend the meeting at which this report was drawn up. It was on that ground, knowing that the committee had not fully carried out the work it was intended to do,—to put the matter in proper shape for presentation to the Government through Council, or in any other way—that I wish to see that committee continued.

THE PRESIDENT: Are you speaking now to this motion of Mr. Armstrong's?

MR. JAMIESON: I do not know that that motion is in order. I thought there was a motion to rescind the former one.

THE PRESIDENT: No; that was carried. We are getting out of order. There is a motion by Mr. Coste, seconded by Mr. Kerry, and an amendment by Mr. Armstrong, seconded by Mr. Hunter.

MR. JAMIESON: Then my remarks are in order. If the Society hopes to present anything to the Government they must have facts and figures and be able to show the utility of a test laboratory and the necessity for it. We have not done anything of that kind yet.

MR. COSTE: Mr. Chairman, I cordially accept on my own behalf, and I think Mr. Kerry will also, the motion made by Mr. Armstrong, because it covers my point.

THE PRESIDENT: Then Mr. Armstrong's motion is the only one before the meeting. Will Mr. Armstrong kindly read his motion?

MR. ARMSTRONG: That the committee be continued, with power to add to its numbers. That when they have a specific scheme in form that the council be authorized to approach the Government, taking with them such other members on the deputation as they may select.

THE PRESIDENT: That is to include the members of the committee, if they like?

MR. ARMSTRONG: Yes, or any others.

MR. GILL: I would like to ask whether or not this meeting can deal with this committee at all. Is it not a committee of Council?

THE PRESIDENT: No; it is a committee of the meeting.

THE SECRETARY: That is a typographical error, Mr. Gill; placing that report among the reports of Council.

(Mr. Armstrong's amendment was then voted upon and carried unanimously.)

THE PRESIDENT: I was asked to appoint a Committee on Out-of-Pocket Expenses. There were very few in the room then, so I will read the names again. (See page 24 of this Report.) It is desirable that this committee should report to the meeting before the end.

I have the following announcement to make. We are informed that at Government House the ladies of the household will not receive with the Lieutenant-Governor, owing to the recent death of his son. That may possibly disturb some of the arrangements of the members. The Secretary tells me that that really has nothing to do with the attendance of ladies at the reception, except that they should know that the ladies of Government House cannot be there. The Lieutenant-Governor will receive alone. The members can put any interpretation upon it they please; we have no further information than they have.

I am also asked to announce as to the dinner given by the Engineering Society to-night at Convocation Hall. If any member or associate member has not yet received his ticket, at the close of the President's address a member of the Engineering Society will be on hand to supply tickets for admission to the dinner.

We will proceed now with business until 4.30 and then adjourn until Saturday if that meets your views.

DISCUSSION ON REPORT ON THE USEFULNESS OF THE SOCIETY.

MR. J. N. RHEUME: Mr. Chairman, desiring, as we do, to further the interests of the Society on the subject of professional ethics, precedence and courtesy in all branches of the profession, it is necessary that we cultivate an esprit de corps, such as we know exists among lawyers and physicians. We have now a large membership, and should exert an even greater influence in the affairs of the Dominion than we do at present. Every member should be impressed with the fact that due courtesy should be shown or precedence given to fellow-members of the profession in whatever branch they may follow. If a country physician is called upon to advise in a matter which he finds is beyond his sphere he does not hesitate to refer his patient to a specialist. A solicitor also does not hesitate to take the opinion of counsel when, in his judgment, it is necessary. There should be an analogous procedure in our profession. The constitution is not very clear in that respect, and I would move that a clause effecting this purpose should be prepared by Council in order that the members may be impressed with the importance of following the correct procedure and giving due precedence in the exercise of any branch of the profession.

THE PRESIDENT: On reading over this report I do not think it calls for a motion of adoption. If you will read the second paragraph of the report you will see what I mean. It is simply a lot of information collected from various sources on the usefulness of the Society. I do not think the committee were prepared to do anything more than give the Society information, and they have given us a body of information from which the Society may make suggestions to the Council.

MR. DION: Mr. Chairman, I think you are right in your conclusion, but at the same time I would call your attention to the second paragraph on page 36, which recommends that certain questions be discussed at the annual meeting; and then follow the paragraphs numbered from one to ten. While we may not be called upon to adopt the report, I think we should discuss it, perhaps clause by clause, and ascertain the sense of the meeting upon them.

THE PRESIDENT: Then the motion is that the report be received and discussed.—Carried.

MR. MOUNTAIN: In reference to clause one. If I remember rightly, there is quite a discrepancy between the student and the associate member with regard to their qualifications for admission to the Society. I know, as a past member of the Council, it often was difficult to define where a member should be. Now, the question is whether the admission to associate membership is going to be raised. I would like to hear the views of some of the members on that. It is possible that a man might be beyond the student class and not eligible for the associate membership.

MR. SCHWITZER: It seems to me that we should not discuss that first clause. It is already in the shape of a by-law.

THE PRESIDENT: Is that the pleasure of the meeting that clause one on page 36 be not discussed? Carried.

THE PRESIDENT: Then the second clause is (reads this clause).

MR. ARMSTONG: Will someone tell us what Mr. Frost said?

MR. LEOFRED: Mr. Frost said that it was no use to try to form a close corporation in America; that he thought the best man would always come to the top and that the people find out anyway after some time who is the best and who is deserving of the best salary and so on. According to my idea it is just as well to say that you can let any humbug of a doctor practice and after he kills a hundred or so people he will be found out and a better man chosen. That is the weight I put on Mr. Frost's remarks on that day. That is my resumé of what he said. (Laughter and applause).

MR GILL: We have now on the statute books of this country an Alien Labor Law which may or may not amount to anything. If that is not efficient to exclude foreigners it is not much use for this Society to try to exclude them. Further, if a foreign engineer is engaged, the Alien Labor Law is there to exclude him if this Society desires to enforce it. But I do not think we will find very many of the best engineers coming over here to look for work. If they do come I think we should welcome them. I think Canadian engineers can take their stand with any engineers. That has been shown within a recent date. For that reason I say we should take no steps whatever. Our Society should be not only a national one, but an international one. (Hear, hear).

THE PRESIDENT: May I read the remarks referred to. These are Mr. Frost's remarks at the last Annual Meeting—(reads).

MR. MORRIS: Mr. President, I am certainly not in favour of the Canadian Society of Civil Engineers asking for legislation to keep out members of any society of engineers of the British Islands or foreigners. There is, however, this complaint; there is pouring into this country through the Grand Trunk Pacific and the other railways, a number of young engineers, or so-called young engineers, from the British Islands, Sweden, France, Germany and the eastern part of Europe; we have sent to us, every short time, a long circular containing a list of names, four-fifths foreigners, who have only been in this country a short time, men whose records are printed but of which we know nothing. We are asked to vote as to whether these men shall be members of this Society or not. I have certainly no objection to expert or competent engineers or men of educational attainments who are competent to act

as engineers coming into this country and joining this Society. I am speaking of young men particularly. The young men who come from the British Islands have probably had a few years' experience as apprentices. They bring with them qualifications, in printed form. No young Canadian has any written qualification, we do not ask for it and we are unable to present it. When any ordinary position opens up—I am not speaking of the higher positions—these young engineers produce their associate membership in this Society and their recommendations. They are on the same standing as our young men who have spent four, five or six years in preparing themselves for this profession. They are in exactly the same position, as far as the public knows, and they are to-day affecting the practice. I am speaking now of that class of engineer who has for the last 20 or 25 years worked up and prepared himself and been able to earn a livelihood by private practice. I am not speaking of the salaried officials of corporations or those men who are independent of these young engineers coming into the country. The point is that a young engineer of one or two years' experience in Europe comes to Canada, gets into the employment of a corporation and in a year or two he asks for his associate membership in this Society. Now, that is difficult to refuse. An engineer in charge of a work, an associate of this young man, will not care to refuse him his certificate. I have refused but it is a hard thing to do and there is the weakness of our system and of our Society. There is no guarantee that the men who receive the stamp of associate membership in this Society are competent. There are young engineers in Toronto to-day who are not members of the Association, for the reason that they feel that although they have spent years on their education they are in no better position before this Society than the great mass of young men coming to this country from Great Britain or foreign countries. I think action should be taken to put the associate membership of this Association on at least as high a standard of qualification as that required for a degree from any of our schools of applied science. (Applause).

MR. SCHWITZER: Mr. Chairman, with reference to the remarks of the last speaker, it appears to me that too great emphasis is being laid on examinations. Take the case of an elderly man coming from England. He may have degrees from some of the best institutions, but if we compel him to take an examination which, according to the last speaker, should be stiffer than any college examination, he cannot pass it. I venture to say that 90 per cent. of our members here present would not like to face again their school examinations, unless they happen to hold the position of professor in a college. I have several foreign engineers in my employment, and, as far as the college men are concerned, they are even better educated than the majority of college men from Canada and the United States. I do not think when we employ a man that we should ask whether he is a Swede, German, Mohammedan, Jew, or what he is. The question is whether he is competent to do the work, and, competence being equal, we will give the preference to a Canadian.

MR. COSTE: What about Chinese?

MR. SCHWITZER: Give the Chinaman a chance if he can fill the bill. Four or five years ago we couldn't get engineers enough to fill the positions and we had to employ foreigners. I do not think we should draw national lines in the engineering profession.

MR. COUTLEE: All that is true, theoretically, that this profession should be as broad as the four winds of heaven; but the fact remains that young Canadians were in Ottawa trying to get work and couldn't get it. Young men just as capable as any foreigner. However beautiful the theory may be, that is, practically, a bad condition. We have 80,000,000 people to the south of us, very nice people, good workmen, but that eighty completely floods out our six or seven million during hard times. (Applause.)

MR. A. W. ROBINSON: Mr. President, with regard to the second clause, I do not think the Society should take any definite stand as to the employment of foreign engineers. As an engineer, I have been able to obtain recogition in the United States and other countries, and no question has ever been raised as to the fact of my being a Canadian. We should be broad enough to be an international Society. It is unfortunately true that many young engineers have found difficulty in obtaining employment during the last year, but it must be remembered that was an exceptional year. It is hard times, and the competition that has occurred is inevitable. As for Englishmen or foreign engineers coming in, I say welcome them to Canada, and if they have the standard of qualification of this Society, welcome them to the Society.

MR. JAMIESON: Mr. President, and gentlemen; on this subject I thoroughly agree with the last speaker, and some of the others, that this Society should take no action to exclude foreigners. Undoubtedly there has been in the past a good deal of dissatisfaction about the employment of outsiders, but I think the remedy would be to broaden some of the employers. In the development of our country we have outsiders coming in and carrying on a great deal of work and they, unfortunately, do not always act as broadly as they should. In fact there is no doubt that preference has been given by employers to outsiders, and that has led to the dissatisfaction referred to. I do not think there is any complaint outside of that.

MR MOUNTAIN: May I call the attention of the President to the fact that it is after half-past four.

THE PRESIDENT: Yes, I think we shall have to adjourn now. There is another announcement I must make, that those who wish tickets for the Society dinner to-morrow night should get them as they leave the hall now.

(At 4.35 adjourned to 10 a.m. on Saturday, 30th January.)

Thursday evening the members of the Society were the guests of the Engineering Society of the Faculty of Applied Science of Toronto University. Some nine hundred members and guests were present, and a most enjoyable time was spent. Before adjourning to the banquet hall, President Galbraith read his address.

In his address Dr. Galbraith pleaded for a broad education for the engineer, in view of the great importance of the part which his work played in the national development. He felt that the time had come when the profession should be under the control of a governing body, as that of medicine or law. Proceeding, he referred to Mr. Andrew Carnegie's statement that the iron ore of the United States, presumably of the higher grades, would be exhausted in forty years, and of England in seven years. "What a prospect," he remarked, "that opens up for the vast resources of Canada, and what a warning to the Government which controls those resources." The future of electric processes in iron and steel production would depend on hydro-electric power. So also would largely depend the development of the great Portland cement industry, which would grow, because concrete would replace steel and wood construction more and more. The conservation and regulation of the rivers for water-power alone, to say nothing of transportation, was necessary for the future industries of Canada. The regulation of the rivers depended on the maintenance of forest growth, and therefore, the future prosperity of the country hinged on that important question. The time might come when, with the development of the aeroplane, electric transportation would be confined to underground tunnels, but it was evident that the age of the electrical engineers in other directions had still to come. Canada could afford to take her time over the development of her mines, but her fisheries and forests must be cultivated, not mined and a policy of ill-regulated extravagance replaced.

The banquet itself was a most successful affair. Besides the large number of prominent engineers present there was also present a number of prominent public men.

After "The King" had been honored, Mr. A. D. Le Pan proposed "Canada." This toast was replied to by Mr. Byron E. Walker, in a brief address in which he outlined with vigor and great earnestness his belief that the young men, especially the engineers of to-day, should study how to conserve Canada's resources from the grasping need of a spendthrift world.

President Falconer replied to the toast "The University," and emphasized the importance of "the man" as well as the engineer.

Mr. J. M. Morris, of Pembroke, the first graduate of the School of Practical Science, on behalf of the graduates, presented Dr. Galbraith with a cabinet of silver. Mr. J. W. Tyrrell, of Hamilton, representing the same donors, presented a gold watch, handsomely engraved, with chain and fob, to Dr. W. H. Ellis. The two recipients, who came together to the college, replied fittingly. Mr. R. J. Marshall, President of the Engineering Society of the University, occupied the chair.

Friday, the G.T.R. placed a train at the disposal of the Society, and some two hundred members visited the Westinghouse works at Hamilton; the Plymouth Cordage Works at Welland, and the Canadian Portland Cement Company works, and the Government elevator at Port Colborne. At Port Colborne the members were the guests at lunch of Mr. J. A. Jamieson, who designed and had charge of the erection and equipment of the elevator, and Mr. M. Haney, contractor, for the foundation work.

Returning from the excursion a banquet was held at the King Edward Hotel. The retiring president was in the chair.

Following is the toast list:—

"Our Guests," proposed by Mr. A. W. Campbell, and replied to by Mr. J. P. Watson, president of the Board of Trade. Mr. W. McNab and Mr. G. H. Frost; "Canada and the Empire," proposed by Mr. R. W. Leonard and answered by Mr. J. A. Macdonald, editor of the Globe; "Kindred Societies," proposed by Mr. M. J. Butler, and responded to by Professor Miller, representing the Canadian Mining Institute; Mr. G. Gouinlock, and Mr. A. G. Van Nostrand.

Mr. G. A. Mountain, in proposing the health of the retiring president, referred to the great services of Dean Galbraith while in office.

Among those present were Messrs. M. J. Butler, Deputy-Minister of Railways; G. A. Mountain, chief engineer of the National Transcontinental, and president-elect of the Society; F. H. McGuigan; J. Osborne, general superintendent of the Ontario division of the C.P.R.; James Leitch, K.C., Chairman of the Ontario Railway and Municipal Board; Prof. W. G. Miller, Provincial Geologist; J. P. Watson, president of the Toronto Board of Trade; G. H. Frost, New York; J. J. Salmond, The Canadian Engineer; C. B. Smith, C. H. Mitchell, chairman of the Toronto branch C.S.E.; J. J. G. Kerry, A. G. Van Nostrand, president of the Ontario Land Surveyors; A. W. Campbell, Deputy-Minister of Public Works; C. H. Rust, city engineer; W. McNab, assistant engineer G.T.R.; E. Marceau, Montreal; Gustave Lindenthal, New York.

Saturday morning the results of the elections were announced. President, Mr. Geo. A. Mountain; vice-presidents, Messrs. W. F. Tye, Col. H. N. Ruttan and G. J. Desbarats; Council, Messrs. J. E. Schwitzer, A. E. Doucet, D. MacPherson, D. A. Ross, N. J. Kerr, R. S. Lea, J. G. Legrand, F. W. W. Doane, C. R. Cantlee, L. A. Vallee and F. P. Gautelius; members of general section, Messrs. F. P. Sherwood and A. St. Laurent; electrical section, Messrs. C. H. Mitchell and L. A. Herdt; mechanical section, Messrs. H. A. Bayfield and W. Kennedy, Jr.; mining section, Messrs. F. L. Wanklyn, Charles Fergie and R. W. Leonard.

Among those present at the annual meeting were the following:—

Nova Scotia.—Bridgetown, H. Lindsay; Sydney, H. C. Burchell.

New Brunswick.—Baie Verte, E. P. Goodwin; Chatham, Geoffrey Stead; Rothesay, J. S. Armstrong; St. John, Wm. Murdoch; Woodstock, C. LeB. Miles.

Quebec.—Buckingham, G. J. Lonergan; Chicoutimi, J. F. Grenon; Hervey Junction, G. H. H. Richardson; Indian Lorette, Henry O'Sullivan; Melbourne, J. W. Harkom; Montreal, deGaspe Beaubien, Frank Chapell, Jas. A. Costigan, J. Duchastel de-Montrouge, J. T. Farmer, Walter J. Francis, S. Gagne, J. H. Hunter, R. E. Hunter, J. A. Jamieson, Geo. Janin, Harold S. Johnston, John Kennedy, W. Alan Kennedy, J. G. G. Kerry, F. C. Laberge, J. G. LeGrand, R. LeSage, G. R. MacLeod, E. Marceau, C. H. McLeod, M. Neilson, E. O'Sullivan, F. T. Peacock, A. W. Robinson, W. J. Sproule, W. V. Taylor, W. F. Tye; Quebec, A. Leofred, M. Wolff.

Ontario.—Almonte, A. Bell; Alvinston, A. S. Code; Amherstburg, L. T. Bray; Bala, H. B. Kippen, E. L. Miles; Berlin, H. J. Bowman, W. H. Breithaupt; Brantford, T. Harry Jones; Campbellford, D. W. McLachlan; Carleton Place, E. T. Wilkie; Chippewa, T. H. Hogg; Cobalt, J. W. Evans, C. Reinhardt; Cornwall, C. D. Sargent; Everett Lake, R. A. Cartwright, G. W. Rayner; Galt, A. R. Goldie; Gowgander Lake, K. G. Ross; Guelph, T. J. Colwill, Jas. Hutcheon; Hamilton, E. G. Barrow, C. D. Booth, E. H. Darling, C. M. Doolittle, J. F. Fleck, T. E. Hillman, R. L. Latham, F. A. McGiverin, Chas. A. Milne, J. H. Ryckman, J. W. Tyrrell; Kingston, L. W. Gill, J. C. Gwillim, Alex. MacPhail; London, C. H. Mathewson, J. M. C. Moore, F. H. Peters; Napanee, F. F. Miller; Newmarket, A. T. Kerr; Niagara Falls, J. C. Gardner, John H. Jackson, N. S. Malcolmson; North Bay, G. A. McCarthy; Oakville, W. K. Greenwood; Ottawa, F. W. Anderson, Wm. P. Anderson, R. deB. Corriveau, Louis Coste, C. R. Coultee, H. M. Davy, W. Bell Dawson, A. A. Dion, G. R. Graham, E. V. Johnson, T. C. Keefer, Jr., A. St. Laurent, A. J. Macdougall, D. MacPherson, Geo. A. Mountain, J. N. Rheaume, R. Steckel, R. F. Uniacke, James White, Wm. Young; Owen Sound, R. W. Bishop, J. M. Kilbourn, R. McDowall; Paris, D. F. McTavish; Pembroke, J. F. L. Millar, J. L. Morris; Peterboro, A. J. Grant, E. V. Moore, H. A. Morrow, R. B. Rogers, L. Sherwood, W. W. Van Every; Port Hope, S. Dingwall; Port Robinson, R. C. Ross; Ridgeway, Walter Jackson; St. Catharines, R. W. Leonard, A. Milne, F. N. Rutherford, J. L. Weller; St. George, B. B. Patten; St. Thomas, Jas. A. Bell, A. Gillies, G. A. McCubbin; Sarnia, John A. Brown; Sault Ste. Marie, F. B. Fripp, S. G. Stone; Smith's Falls, S. B. Code; Stratford, J. D. Barnett, M. Ferguson; Toronto, K. L. Aitken, F. G. B. Allan, E. M. Ashworth, Hugh C. Baker, Jr., T. T. Black, W. D. Black, A. C. D. Blanchard, O. B. Bourne, A. A. Bowman, E. Brandon, Ross Bremner, Wm. A. Bucke, Acton Burrowes, D. G. Calvert, A. J. Campbell, A. W. Campbell, G. L. Campbell, C. M. Caniff, W. P. Chapman, F. T. Chestnut, Willis Chipman, Geo. T. Clark, H. S. Clark, A. W. Connor, Robt. J. Cory, E. L. Cousins, J. C. T. Crofts, T. H. Crosby, F. Curts, N. F. Death, C. W. Dill, W. E. Douglas, R. B. Evans, G. E. Evans, C. L. Fellowes, G. H. Ferguson, W. J. Fuller, F. A. Gaby, J. Galbraith, J. S. Galletly, L. P. Gordon, R. T. Gough, P. W. Greene, H. S. Greenwood, J. W. G. Greey, R. E. W. Hagarty, M. J. Haney, W. Almon Hare, H. E. T. Haultain, M. C. Hendry, J. B. Heron, A. L. Hertzberg, E. G. Hewson, J. W. Hunter, H. M. Hyland, T. C. Irving, Jr., E. A. James, W. E. James, Gordon T. Jennings, W. A. Johnson, John B. Johnston, E. H. Keating, G. C. Keith, W. R. Key, K. W. Klingner, F. C. Lamb, F. A. Lee, D. O. Lewis, W. B. Lindsay, Harry C. Lett, A. L. McAllister, A. F. Macallum, K. A. MacKenzie, J. G. MacKinnon, W. A. MacLean, A. J. Maclennan, R. J. Marshall, N. M. McLeod, E. B. Merrill, C. H. Mitchell, P. H. Mitchell, J. W. Moffat, E. D. Monk, H. A. Moore, A. L. Mudge, T. Aird Murray, C. W. Noble, J. M. Oxley, W. S. Pardoe, H. J. Peckover, G. S. Powell, D. C. Raymond, E. Richards, R. K. Russel, W. B. Russell, C. H. Rust, J. J. Salmond, N. Sharpe, C. B. Smith, O. W. Smith, F. L. Somerville, P. W. Sothman, A. F. Stewart, J. L. G. Stuart, W. G. Swan, S. H. Sykes, Wm. Thompson, Chas. G. Toms, J. B. Tyrrell, G. Vansittart, A. P. Walker, H. Walker, J. A. Walker, S. B. Wass, A. F. Wells, T. H. White, Jas. Wilson, W. E. Young; Walkerville, C. M. Goodrich; Welland, G. C. Cowper, R. H. Harcourt, G. Ross, H. F. Stoddart; Winchester, T. H. Dunn; Windsor, M. E. Brian, Patrick Davis, C. Hamilton, E. G. Henderson; Woodstock, F. O. Canfield, F. H. McKechnie; York, A. Bradt.

Manitoba.—St. Boniface, M. C. Blair; Winnipeg, T. R. Deacon, J. E. Schwitzer.

Saskatchewan.—Regina, A. J. McPherson, W. R. W. Parsons; Saskatoon, H. W. D. Armstrong.

Alberta.—Calgary, W. A. O'Flynn.

British Columbia.—Fernie, R. W. Coulthard.

Foreign.—Oaxaco, Mexico, Alex. H. Smith; Buffalo, U.S.A., A. W. Thorn; Chicago, U.S.A., R. Modjeski; Cleveland, U.S.A., Virgel G. Marani; Detroit, U.S.A., T. T. Irving; Michigan City, U.S.A., Abe Balsley; New York, U.S.A., H. F. Ballantyne, Geo. H. Frost, G. Lindenthal, E. W. Stern, T. Kennard Thomson; Pittsburg, U.S.A., F. W. Speller.

THE ENGINEER'S TEN COMMANDMENTS.

In his presidential address to the Glasgow Technical College Scientific Society, Mr. A. G. Strathern quoted the following as being worthy of consideration:—

"(1) Thou shalt not prefer any science before me, as without me they are nothing. (2) Thou shalt not make a fetish of anything or anybody, but always look at things squarely for thyself. (3) Thou shalt not take mechanics in vain; it is a serious business.. (4) Remember the first law of all mechanics, that you can get no more out than you put in; generally not so much. (5) Honour honesty and common sense wherever you meet them. (6) Thou shalt not kill any idea that thou art too stupid to understand (7) Thou shalt not put a machine to do work where a man can do it cheaper; do not defame me by being mechanically wild. (8) Thou shalt not steal another man's ideas and pass them off as thine own. (9) Thou shalt not be an expert witness. (10) Thou shalt not worry thyself over what other people are doing, decrying everything about thine own place or country; if there is anything wrong, get a move on thee and better it." Mr. Strathern adds an eleventh commandment, which we think is broken more often than any of the ten, viz., "Thou shalt not say to thyself, or anybody else, 'I would do more work if I were better paid'; but thou shalt perform to the best of thy ability, irrespective of thy remuneration; thou shalt then receive thy reward. Remember thy employer will not bribe thee to do thy duty."

OBSERVATIONS ON BLASTING WITH HIGH EXPLOSIVES.

By E. M. Weston.*

In a paper read before this society nearly three years ago, I made some observations on blasting practice, and I tried to evolve some general rules drawn from my own practical experience. Apparently I did very little else but get myself into trouble as a dangerous heretic, but really, after all, nobody seemed to know much about the subject. I felt certain, however, that given the assumption of a homogeneous rock, or one having well defined heads or partings, with charges of known weight placed in chambers of known dimensions, the subject could be treated mathematically. I have since found that the few laws I guessed at regarding direction of holes and charges of explosives in relation to the burden, and of burden in relation to free face were in the main correct. Readers of books on blasting will find each writer saying the theory of the other is wrong. Gillette in his "Rock Excavation" makes some shrewd observations, but the "Blasting of Rock" by A. and Z. Daw, if read in the light of practical experience and by people ready to break every commandment laid down in the blasters' decalogue, if they can thereby save time and money, is, I think, a valuable book. I will try and tear out the gist of it, leaving out the mathematical proofs and that part dealing with quarrying. Ten conditions are first laid down which influence the force and effect of a blast: —

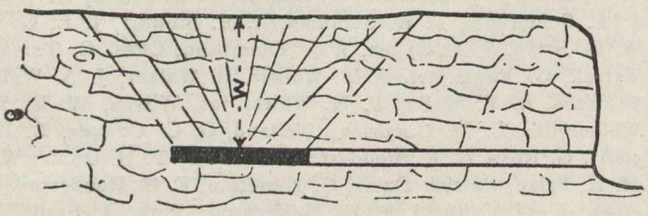


Fig. 1.

(1) The size and number of the faces. A drive has one face, a stope two, a bench on an open cut, three.

(2) The tenacity or cohesive strength of the rock.

(3) The structure of the rock, whether jointed, massive, laminated, stratified or fissured.

(4) The strength and nature of the explosive.

(5) The character of the fuse and tamping.

(6) The thermal conductivity of the rock.

(7) Whether the blast acts alone, or simultaneously with others.

(8) Whether the rock falls when broken, or has to be lifted.

(9) The specific gravity of the rock.

(10) The size and form of the chamber.

(11) One might also add that a blast is also influenced by the length of the line of resistance, in proportion to that of the height of the face and of the length of the hole itself.

Daw proves that the formula $L = CW^3$ where L represents the weight of charge necessary, and where W = the line of resistance or the shortest distance from the charge to the nearest face of rock, and C = a coefficient found from experiment representing the relative resistance of the particular rock to rupture, leaves out of consideration most of these factors and is useless when considered by itself. The force generated by the detonation of explosives, to be successful, must overcome (a) the resistance due to the cohesion of the rock tending to resist rupture; (b) the resistance due to the mass or weight of the rock. This is not relatively important in stoping, and where the rock is shot down it even assists rupture; (c) the resistance due to the jambing or hanging of the rock pieces together and along the lines of fracture. The force must act at 90 deg. to the face for maximum results. The force exerted by a blast on the rock must be shearing and not bending or stretching, because the explosive is in a small chamber and its force is suddenly applied to an inelastic rock mass. The force required to produce rupture by shearing, according to the theory of mechanics, where P = force required to produce rupture and S denotes the periphery of the chamber in which the explosive is placed, W equals the line of resistance and K_1 = a factor that represents the comparative resistance of that rock to shearing as determined, say, in laboratory in ft. lb. per sq. in. = the modulus of shearing for the particular rock. Then $P = SWK_1$.

Daw made experiments in ice, and proves that this formula holds good for gradual rupture, and he proves that suddenly applied forces produce similar results. The question that he seems to have neglected to investigate is, what effect varying the size and shape of the face have in regard to the other factors. In his experiments the area of face is varied within very narrow limits. He never defines a face. This seems to me a serious omission, when we wish to apply this formula to actual mining. For instance, we have a hole of 1¼ in. diameter bored in the face of a stope, which is 6 ft. high, the hole is 6 ft. deep, bored parallel to the face of the bench. The burden on the hole, which is the line of resistance = W is 3 ft. The charge occupies 2½ ft. of the hole. $P = SWK_1 = (1¼ \text{ in.} + 30 \text{ in.} + 1¼ \text{ in.}) \times 36 \text{ in.} \times$ modulus of rupture of quartzite to shear. The area of the face at right angles to the line of resistance W is then $6 \times 6 = 36$ sq. ft. Take the same hole and the same charge in a stope only 3 ft. high, according to the formula, the effect should be the same. We know very well, however, that the first hole would break and the second one would not. The area of face being 6×3, or 18 sq. ft. in the second case. According to the authors, the rock should apparently shear in a plane parallel to W. as readily as it does to form the usual frustum of a pyramid with fracture planes at 45 deg. to W.

This formula is neither true or satisfactory as thus stated. It is true only when the height and length of the face bear a certain ratio to W and to S, so that the limiting lines of fracture set off from the perimeter of the sides of the chamber, at an angle of 45 deg. fall within the area of the face. The authors then point out that with two faces available two portions of the rock may be ruptured off by shearing. "Owing to the inelatsic nature of rock and the sudden force applied, equal tension is produced in the rock parallel to the line of resistance for any section that may be blasted," and that the resistance to rupture of the cross section parallel to the line of the hole may be equal to the resistance to shearing, and should be so to prevent "bull-ringed" holes. If F represents the area of such a cross section and K the modulus of rupture of rock $P = FK \therefore FK = SWK_1$.

Hence the authors argue that where there are two faces, any hole should be given such a length in proportion to its burden, or W, that the rock lying between that portion sheared off directly in front of the charge, and the free face at the mouth of the hole will also be ruptured off. The force tending to produce rupture in blasting is proportional to the periphery of the chamber containing the explosive, such periphery taken at right angles to W, or line of resistance. "The section of rock that may be ruptured is proportional to the periphery of the chamber for a given line of resistance." It is owing to the condition that low explosives are employed to advantage in rocks of comparatively small cohesive strength, or where there are many lateral faces and joints. These are used in large holes and are more economical than high explosives in small holes. Thus a mass of rock such as shown in Fig. 3, with high explosives would merely break a crater, as the cross section or the periphery at the top and bottom of the charge would be too small to give sufficient force to shear the rock along the hole and beyond it.

It seems to me that the authors have neglected the rupturing effect of gases from the charge escaping along the hole between the charge and the mouth of hole. This must, I think, have some effect in blasting; a larger effect with lower explosives, and a smaller effect with high explosives. Those who have seen a long hole fired have noted that the rock from the mouth is shot outwards quite as much as up-

* Abstract of paper read before Chem. Met. & M. Soc. of So. Af.

wards, apparently by a force acting directly behind it. Regarding most mining here, we may, I think, neglect consideration of the resistance due to the weight of the rock blasted and the resistance or drag of the fractured rock to further movement, though occasionally in a stope we do see where a hole has had a charge large enough to fracture the rock without moving it. When previously endeavouring to

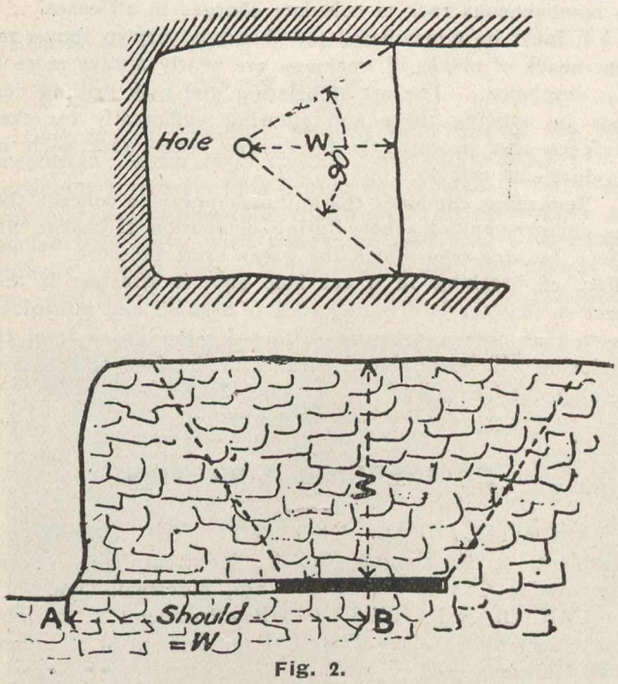


Fig. 2.

estimate the increase of resistance to rupture of holes due to increase of burden, or increase of W, I hazarded the opinion that the increase varied as the square of the burden of W^2 for the same explosive. The authors prove this to be true, mathematically. Now we see why as generally conducted breaking rock with hand holes in a stope, say, 48 in. wide, is much more economical in explosives than breaking the same ground with machines. The 6-ft. machine hole carries double the burden of the 3-foot hand hole, but requires four times the explosive or more, and the question to consider is, cannot we bore and blast machine holes so as to reduce this difference? The authors say, "for the same explosive the resistance of cohesion to rupture in blasting varies as the square of the line of resistance." But here again we note that no consideration is apparently given to the size and shape of the faces. Or what would happen if the face is only partially free, as in a narrow stope. The force developed by an explosive placed in a chamber in the rock depends on the following conditions:—

(1) The quantity of the gases produced. This in turn depends on the quantity and "power" of the explosive used, and I would add, the class or degree of detonation produced.

(2) The temperature of the gases at moment of detonation.

(3) The expansion of these gases due to heat liberated by the chemical combinations started by detonation.

(4) The time occupied in obtaining the maximium expansion or pressure.

(5) The size and form of the chamber.

(6) The thermal conductivity of the surrounding medium.

I would add to these:

(7) The amount of cohesion and tamping employed with certain explosives.

(8) The thermal conductivity of such tamping.

Explosives are of two classes—"low" or slow and rending, and "high" or quick and shattering. Of the first, gunpowder is the best known example. The explosives used here, gelignite, gelatine, dynamite, and blasting gelatine belong to the latter class. In the former, chemical combination goes on comparatively slowly and gases are evolved gradually and at a low temperature. In the latter the substance is gasified almost instantaneously. "The full force of the gas is at once exerted in all directions and upon every part of the containing body; because motion requires time, and there is no time for the part that yields to move before full pressure is developed." This has given rise to the popular idea that dynamite, etc., acts downwards. Nitroglycerine exerts a pressure on detonation of 12,000 kilo, per sq. centimetre, or about 25,000 lb. per sq. in., and blasting gelatine very little less. Only about 14 per cent. of the actual energy of the explosive is employed in doing useful work in shattering and displacing rock. This seems a very small proportion; but combustion or detonation is not always complete, gas escapes by holes and fissures, and the surrounding rock absorbs quite a lot of energy in the form of heat. Then the rock that is not displaced is "shocked," heated, and pulverized, and waves of force are sent through the surrounding rock and air. "If we assume that each unit of the same explosive compound will develop the same quantity of gases and attain the same maximum pressure under like conditions," two laws of the statics of fluids and gases help us to judge the relative force developed by an explosive. These laws are:—

(1) That the pressure exerted by a fluid upon the different parts of the walls of the containing chamber proportional to the areas of these parts.

(2) That the pressure exerted by a fluid in any direction upon a surafce is proportional to the projection of the surface at 90 deg. to the given direction.

Rock is inelastic, the limit being reached in most rocks with a slight change of form, therefore "there will be no appreciable enlargement of the chamber before rupture takes place." This is laid down by the authors; but is this reasoning quite sound? We know blasting enlarges the holes by reducing the walls surrounding the charge to an impalpable powder.

This is done either before rupture, during rupture, or after rupture. It cannot well be after rupture, and taking the case of a hole that fails to break and blows out one would think that the gases expend force over the enlarged area before they seek exit along the hole. What do others think? The authors in speaking of cut holes seem to concede that such an action takes place. Then it follows that rupturing force P produce in any hole is equal to the maximum pressure produced multiplied by the projection of the chamber at right angles to direction of rupture = W. Therefore with the same explosive rupturing force is proportional to the cross sectional area of the chamber at 90 deg. to W. And in comparing two holes having the same charges (which must entirely fill the chamber to develop their full power), that charge which is in a chamber having the greatest area at 90 deg. to W in proportion to its size will do the most work. This is true, however, only within limits, as the thermal conductivity of the rock may absorb too much power in a very thin chamber. Hence, say the authors, ¾ in. should be the minimum thickness of a charge.

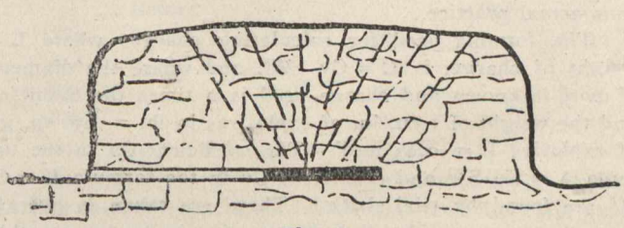


Fig. 3.

It will be seen that the cylindrical form of chamber as bored in rock by a drill is not the most economical. If we could put the charges we now use into chambers having a thickness parallel to the free face double that of their depth we could reduce explosives used by nearly 50 per cent. This raises the question what is the effect of "chambering," "bulling," or springing holes in hard ground in our stopes? It is here generally wasteful in explosives and not at all useful, as we require elongated charges for the best results. In very long holes in softer ground in quarrying and in very high stopes it is very useful. The authors then prove that in blasting tight rock where joints and fissures are not well

developend, the diameters of boreholes should be directly proportional to the lines of resistance. Working with gelatine dynamite in strong granite which approximates the conditions here, they give the following table which is so interesting that I trust I am not acting unfairly in giving it nearly in full.

Diameter borehole in.	Depth of borehole ft. in.	Length of charge in.	Weight of charge lb.	W = line of resistance = burden ft. in.
¾	3 2	9	.22	2 4½
1½	6. 3	18	1.75	4 9
1	4 2	12	.50	3 2
2	8 4	24	4.20	5 4

In softer ground Eissler gave 1¼ in. diameter for 5 ft. (= W).

In softer ground Eissler gave 1½ in. diameter for 6 ft. (= W).

In softer ground Eissler gave 1¾ in. diameter for 7 ft. (= W).

I pass over several interesting chapters on simultaneous blasts and turn to discuss what length, charges in cylindrical holes should bear to the diameter of hole where there are two faces. The ratio is given as from 8 to 12 d where d = diameter of hole. If there are two faces an elongated charge is the proper one to employ, not a concentrated one made by "bulling" or "chambering" the hole. The authors also prove that, when we find, say, 8 in. of charge suits a hole 1 in. diameter to move a burden of 24 in., then if we increase the burden to 36 in. and use a 1½ in. hole the same length of charge is the right one.

The authors next consider the best position for a chamber or charge when there are two faces at right angles as in stoping. To obtain the best effect with a blast in rock there must be equilibrium of resistance on all sides of W to the action of the charge.

On this depends the right depth of hole to bore for any given burden. In hard ground the distance from the centre of an elongated charge to the mouth of the hole at right angles to the line of resistance, as in stope bench, should be equal to the burden of W, Fig. 2. For example, we have a stope 6 ft. high; the hole has a burden of 3 ft.; the charge will equal, say, 5 sticks of 1¼ in. gelatine; the hole being 1¼ in. diameter at bottom; the charge takes up, say, 30 in. of the hole. According to the author, the right length of hole would be 36 in. + 15 in. = 51 in. only. In practice we use holes 60 to 72 in. Hence, as I suggested, pressure of gas escaping along the hole must have some effect, or planes in the rock must greatly affect the result. Formulæ are given for calculating borehole charges; but as the coefficients Ca, etc., for the various rocks met with here are not available, it would be useless to check the calculations from actual practice.

The formula used for calculating charges where L = weight of charge, is $L = Cv\ W^3$, and where the diameter of bore is known and charge used is n times the diameter, and the weight of 1 cu. in. of explosives in lb. = .036 sp. gr. of explosive $L = .0283\ ngd^3$. The coefficient Ca in the formula A = Ca SW and coefficient Cv in the formula $L = Cv\ W^3$ are found by trial shots. These are taken in average ground on average benches, as nearly similar as possible. Say 3 holes are bored with burdens of 2 ft., 2½ ft. and 3 ft., and are 1 in. diameter and are charged to a depth of 8 d with explosive. Then supposing the hole having a burden of 2½ ft. and a depth of 2 ft. 10 in. just breaks, throwing the broken rock only a short distance; from the equation A = Ca SW.

$$Ca = \frac{A}{SW}.\quad A = 8 \text{ square in. } S = 2\ (8 + 1) \text{ in.}$$

$$\text{Then } Ca = \frac{8}{18 \times 30} = .015.\ C = .02$$

about for rocks such as are blasted here.

To find Cv in formula $L = Cv\ W^3$, W = 2½ ft. The weight of the charge L in ounces, taking the specific gravity of explosive (say, dynamite = 1.6), the weight of a cubic inch of dynamite = .036 × 1.6 × 16 = .9216 oz. ∴ L = .7854 × 9216 × 8 × (1 in.)² = 5.79 oz. then as W = 2½ ft.

$$Cv = \frac{5.79}{(2\frac{1}{2})^2} = .37$$

Theoretically this formula should enable anyone working in homogeneous rock to calculate charges in all cases.

It must be remembered that benches vary in shape and that heads of planes of weakness are nearly always more or less developed. The art of blasting and rock drilling consists in noticing these and allowing sufficiently for their presence and in correctly forecasting what work each individual shot will do.

Regarding cut holes the authors appear to concede that the enlargement of a hole during detonation of charge may affect the area over which the gases exert pressure. "The effect of breaking in a cut hole shot is greatest if they meet so that the intervening rock is fissured and pulverized, as in that case a pressure surface for the gases from the explosion will be produced parallel to the face of the drive between the boreholes."

ENGINEERING SOCIETIES.

ARCHITECTURAL INSTITUTE OF CANADA.—President, A. F. Dunlop, R.C.A., Montreal, Que.; Secretary, Alcide Chaussé, P.O. Box 259, Montreal, Que.

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

CANADIAN STREET RAILWAY ASSOCIATION.—President, J. E. Hutcheson, Ottawa; Secretary, Acton Burrows, 157 Bay Street, Toronto.

CANADIAN INDEPENDENT TELEPHONE ASSOCIATION.—President, J. F. Demers, M.D., Levis, Que.; Secretary, F. Page Wilson, Toronto.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—413 Dorchester Street West, Montreal. President, J. Galbraith; Secretary, Prof. C. H. McLeod. Meetings will be held at Society Rooms each Thursday until May 1st, 1908.

QUEBEC BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—Chairman, L. A. Vallee; Secretary, Hugh O'Donnell, P.O. Box 115, Quebec. Meetings held twice a month at Room 40, City Hall.

TORONTO BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—96 King Street West, Toronto. Chairman, C. H. Mitchell; Secretary, T. C. Irving, Jr. Traders Bank Building.

MANITOBA BRANCH OF THE CANADIAN SOCIETY OF CIVIL ENGINEERS.—Chairman, H. N. Ruttan; Secretary, E. Brydone Jack. Meets first and third Friday of each month, October to April, in University of Manitoba.

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

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

CANADIAN MINING INSTITUTE.—Windsor Hotel, Montreal. President, W. G. Miller, Toronto; Secretary, H. Mortimer-Lamb, Montreal.

CANADIAN CEMENT AND CONCRETE ASSOCIATION.—President, Peter Gillespie, Toronto, Ont.; Vice-President, C. T. Pulfer, London, Ont.; Secretary-Treasurer, Alfred E. Uren, 62 Church Street, Toronto.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, J. H. Winfield; Secretary, S. Fenn, Bedford Row, Halifax, N.S.

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

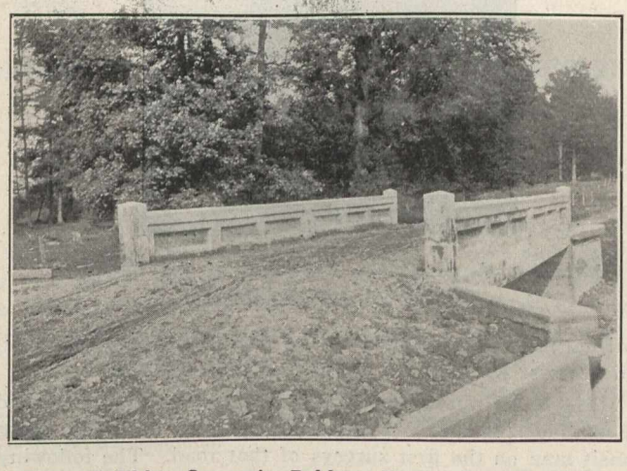
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—29 West 39th Street, New York. President, H. L. Holman; Secretary, Calvin W. Rice.

CENTRAL RAILWAY AND ENGINEERING CLUB.—Toronto. President, C. A. Jeffers; Secretary, C. L. Worth.

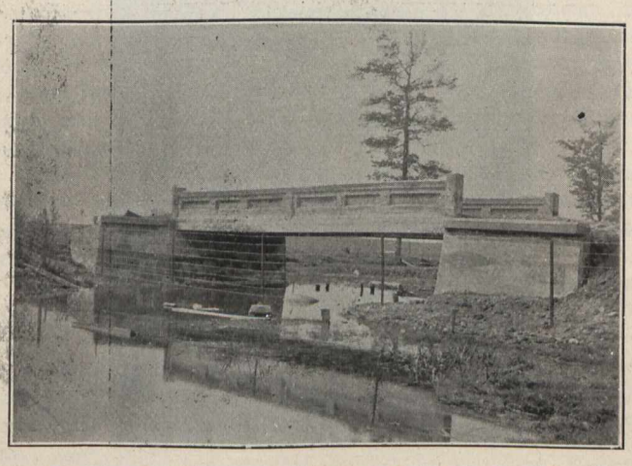
WESTERN SOCIETY OF ENGINEERS, 1735 Monadnock Block, Chicago, Ill.—Andrew Allen, President; meets regularly first Wednesday in each month.

ELDER CONCRETE BRIDGE, HURON COUNTY, ONT.

Of several concrete bridges built during the past season in Huron county, Ont., the Elder Bridge is of particular interest. This bridge has a span of thirty-five feet and a fourteen-foot roadway. The abutments are twelve feet high, with wings ten and twelve feet long, and are twenty inches at the foundation, one foot at the top, and have an eight-inch batter in front. The abutments have a five-foot foundation one foot in depth. There are five buttresses, three on front wall and one on each wing. They extend to the back of the foundation and slant to top of wall. The wall and wings are reinforced with half-inch mild steel rods, running eighteen inches apart, both vertically and horizontally. The buttresses have a rod up the back, and rods eighteen inches apart hooked to the back rod and to the vertical rod opposite them in the wall.



View of Elder Concrete Bridge, Huron County, Ont., showing Panelling.



Elder Concrete Bridge, Huron County, Ont.—An Artistic Bridge Design.

Of the four girders, the two centre girders have steel girders, fifteen inches wide, with six-inch web. concrete is placed so that it is just the width of the web at the bottom, and is eighteen inches wide at the top. The outside girders are steel girders, six inches wide, with about four-inch web, placed in concrete girders fifteen inches deep and twelve inches wide, and are directly under the railing. The floor is six inches thick in centre and four and one-half at outside edge. It is reinforced with expanded metal.

The railing is two and one-half feet higher than the floor, with three rows of rods running horizontally the full length, with vertical rods about four feet apart. It has posts one foot square and three feet high at each end, and is panelled as in the illustration shown herewith.

The concrete for abutments was mixed in the proportion of six to one, while that for the floor and railings was mixed three to one and for the girders three to one. The plans were prepared by Mr. J. A. Bell, C.E., of St. Thomas. The contractor was Mr. L. McCandless, concrete contractor, of Sparta, Ont., who constructed several concrete bridges in Huron county during the past season.

The total cost amounted to about $900. The gravel cost $1.25 per yard on the ground, and stone fillers about the same. The steel cost $150. The following view illustrates the artistic effects due to panelling and the general design of the bridge.

WATER FILTRATION.

In interest taken in securing of pure water for our public water supply increases. In this connection a report on the Montreal water supply as presented by a committee of the Medico-Chirurgical Society is of special value. The report is as follows:—Your committee find that there is a very general and growing interest in the water supply of cities and towns; that the people rightly demand a plentiful supply of pure water that they and their children may use with impunity, and the state is recognizing more and more the importance of supplying to the people a liberal quantity of pure water for economic reasons.

There would seem to be a great unanimity of opinion with regard to the method of obtaining a good water supply. That obtained from water-sheds has proved expensive, difficult to control, and unsatisfactory in its purity. The most satisfactory results are obtained from earth water and filtered water.

In Europe, the filtration of the public water supply has been in use for more than 75 years. In Germany it has now been made practically obligatory on cities by the Imperial Board of Health. Indeed, the adoption of filters in Europe is not confined to thickly populated districts, the city of Liverpool takes its water supply from an almost uninhabited district in the Welsh mountains. This water, however, is carefully filtered.

One or two instances will illustrate very clearly the benefits derived from filtration of the public water supply. The death rate from typhoid per 100,000 of the population before and after filtration in the city of Lawrence is an example.

Before.		After.	
1889	127	1894	47
1890	134	1895	31
1891	119	1896	19
1892	105	1897	16
1893	80	1898	16

The city of Albany affords another instructive example. During the five years before the filtration of the water supply was carried out the death rate from typhoid was:—

Before.		After.	
1895	119	1900	37
1896	64	1901	21
1897	80	1902	28
1898	87	1903	19
1899	69	1904	19
		1905	19
		1906	16
		1907	20

This is a very marked reduction, although it must be noted that one-third of the water supply of Albany is unfiltered water from gravity streams.

If we now look across the water, we find that the death rate from typhoid per 100,000 of the population is:—

Berlin	8
Breslau	10
The Hague	6
London	15
Rotterdam	5
Zurich	8

Perhaps the most striking illustration of the benefits of filtration was afforded by the well-known experience of the cities of Hamburg and Altona during the cholera epidemic of 1892. These cities are situated side by side on the right bank of the Elbe, and both take their water supplies from that stream, the Altona intake being placed but a few miles below the point where the sewers of Hamburg discharge into the Elbe the sewage of nearly 800,000 people. The two cities are practically one, being built thoroughly to the dividing line on the valley of the Elbe, Hamburg, which used the unfiltered water of the Elbe, suffered severely, as is well known, from both sides. In the winter of 1892-93, when the cholera visited the disease, while Altona, which used the same water, after it had been further polluted by the cholera polluted sewage of Hamburg, but filtered it, had only a relatively few scattered cases, which were generally traceable to the use of Hamburg water by transient visitors to the adjoining city.

The Montreal death rate from typhoid per 100,000 of the population was as follows:—

1903— 90	31.45	per	100,000
1904— 94	31.89	"	"
1905— 55	18.11	"	"
1906—130	37.08	"	"
1907—122	33.26	"	"

The difficulty of finding typhoid germs in the suspected water has sometimes raised the question as to whether the water supply was responsible for the typhoid fever so prevalent in so many cities. In these conditions it must be remembered that the germs probably enter the water only at intervals, and pass away. As to how long they can live in the water will depend very largely on the amount of food, the temperature and other factors in the water. There seems to be some difference of opinion among authorities as to how far running water purifies itself, particularly when flowing over rapids.

Dr. Thos. Darlington, Commissioner of Health, New York City, states that, "It is an old but fallacious idea that flowing water purifies itself. Within a short distance of its course the impurities discoverable by chemical methods may be entirely lost; bacteriologically, or rather, from a pathogenic standpoint, however, it does not change perceptibly."

Pittsburg, Philadelphia, and Washington, are now expending large sums of money in establishing filtration plants for their entire water supplies. Filtration will remove 98-100 of the bacteria from the water. Over 500 cities and villages in the United States have filtration plants, and many more are in the process of construction.

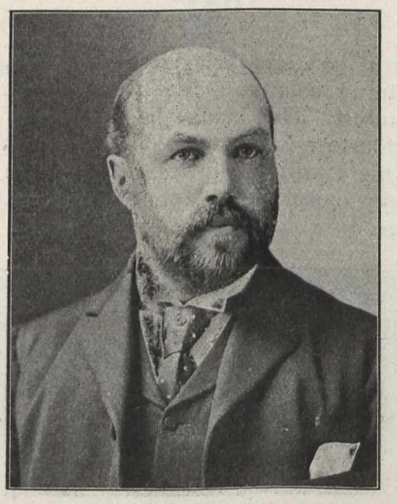
The milk supply is often responsible for the spread of typhoid, but, on the other hand, the milk itself is contaminated by the water. The contamination of the water in the country districts is often due, doubtless, to the people who contract typhoid in the cities. The benefits arising from a supply of filtered water are no longer matters of debate, but have been demonstrated by the large number of cities and villages that have already adopted the system.

Your committee are of the opinion that this society should now act with a view of influencing the City Council and demonstrating to the citizens and aldermen of Montreal the advantages of a liberal supply of filtered water, and the advisability of taking steps to secure it. Your committee think that it might be advisable for this society to invite the co-operation of the Society of Civil Engineers, with a view to determine more definitely the best means of securing a supply of pure water. It has also been thought by the committee that it would be well, also to invite the co-operation of the French Medical Society.

MR. GEO. A. MOUNTAIN.

The president-elect of the Canadian Society of Civil Engineers is a man well-known to the profession in Canada familiar with the organization, routine and aims of the Society.

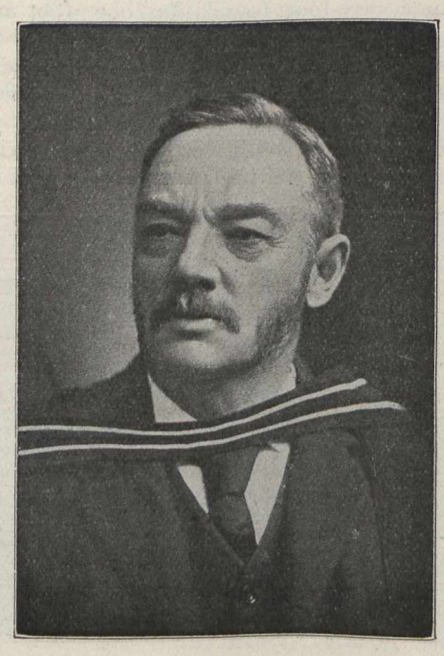
Mr. Mountain was born in Quebec in 1860 and educated in the schools and colleges of his native city. After completing his college education he served apprenticeship as a



Mr. Geo. A. Mountain, President of the Canadian Society of Civil Engineers.

civil engineering student with the City Engineer of Quebec, and Messrs. Knipple and Morris, of London, Eng.

In 1878 his railway experience commenced when he joined the staff of the Quebec and Lake St. John Railway, being transit man on the first surveys of that road. The following year he was engaged on the original surveys of the Prince Louise Embankment, Quebec, and the Graving Dock at Levis. In 1880, Mr. Mountain went to Newfoundland and



Dr. John Galbraith, Immediate Past-President of the Canadian Society of Civil Engineers.

for one year was Assistant Engineer on Division E. of the Island Railway. Returning to Canada the following year, he joined the staff of the Canada Atlantic under Walter Shanley, serving under him as Assistant Engineer until Mr. Shanley's resignation in 1886, when Mr. Mountain was made Chief Engineer of the Canada Atlantic Railway.

While Chief Engineer of the Canada Atlantic, and besides his work for this road, Mr. Mountain carried on many other large engineering works. In 1890 he commenced the surveys of the Ottawa, Arnprior and Parry Sound Railway

from Ottawa to the Georgian Bay, which were completed in 1897 and afterwards formed part of the Canada Atlantic Railway system. From 1892 until 1904 he was also Chief Engineer of the St. Lawrence and Adirondack Railway, a line projected from Valleyfield, Que., to Malone, Ont.

In 1904 the Dominion Government organized the Board of Railway Commissioners for Canada, and Mr. Mountain was selected as their chief engineer. Acting in that capacity he has been brought in touch with engineers in every part of Canada, and aside from purely business relations he has been able to gain a knowledge of the views and ideals of the profession in Canada unequalled by any other man. The possession of this information by the executive head of the Society will undoubtedly be of great value to the profession.

Besides being a member of the Canadian Society of Civil Engineers Mr. Mountain is a member of the American Railway Engineering and Maintenance of Way Association; the American Superintendents of Bridges and Buildings Association; the Royal Astronomical Society and the Dominion Land Surveyors.

ORDER OF THE RAILWAY COMMISSIONERS OF CANADA.

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

5979—December 30—Dimsissing application of the C.N.O. Railway, for authority to replace its lines and tracks across lines and tracks of the C.P.R. spur to the property of the Barber Asphalt Company, at a point south of Eastern Avenue, between Olive Street and Cypress Street, Toronto.

5980—December 30—Authorizing the C.N.O. Railway, to divert concession road between concessions 2 and 3, Township of Albert, County of Prescott, between mileages 13-14 west from Hawkesbury.

5981—December 30—Dismissing application of the Vancouver, Westminster and Yukon Railway, for authority to construct a branch line within the municipality of North Vancouver, from a point on its main line near the mouth of Seymour Creek, on the north shore of Burrard Inlet, to a point at or near Deep Cove, on the north arm of Burrard Inlet, B.C.

5982—December 29—Directing the C. W. & L. E. Railway Company to equip its cars with air brakes, within 3 months from the date of this order.

5983—January 22—Authorizing the C.N.O. Railway to construct a wire across the Montreal and Ottawa Road in the Township of Cumberland, County of Russell, Ontario, mile 39, west from Hawkesbury, Ont. (West 1½, Lot 3, Con. 1), and across Cameron Street, (Lot 15, Con. 1), near the municipality's station grounds.

5984—December 31—Authorizing the Bell Telephone Company to place its wires across the tracks of the Canadian Northern Quebec Railway, at Charlesbourg Road, ½ mile west of Quebec, Que.

5985—December 31—Authorizing the Bell Telephone Company to place its wires across the tracks of the C.N.O. Railway Company, 50 yards north of Brechin Station, Ont.

5986—December 31—Authorizing the Bell Telephone Company to place its wires across the tracks of the C.N.Q. Railway Company at St. Valier Road, 4 miles west of Quebec, Que.

5987—December 31—Authorizing the Adams River Lumber Company to lay an 8-inch water pipe under the C.P.R. tracks where the same crosses near Chase Creek, 2 miles west of Shuswap Station, B.C.

5988—December 31—Authorizing the Byron Telephone Company to place its wires across the tracks of the London & Port Stanley Railway Company, between Concessions 2 and 3, and Concessoins 3 and 4, Township of Westminster, Middlesex County, Ont.

5989—December 31—Directing the G.T.R. Company to install at the crossing of its line with L'Esperance Road, in Tecumseh, Township Sandwich East, Ont., an automatic electric bell with a cut-off opposite the station, subject to the terms and conditions in Order of the Board No. 875, dated December 8th, 1905.

5990—January 2—Authorizing the British Columbia Telephone Company to place its wires across the tracks of the Esquimalt & Nanaimo Railway Company, at Duncans, B.C.

5991—January 2—Authorizing the G.T.P. Railway Company to carry freight traffic over its line from Winnipeg, Man., to Battle River, Alta., notwithstanding that such portion has not been opened for traffic, according to section 261 of the Railway Act; and rescinding Orders 3,780, dated October 11th, 1907, and 5,917, dated December 22nd, 1908.

5992—January 2—Authorizing the G.T.P. Railway Company to carry freight traffic over its line of railway from Fort William to end of track, mileage 0.00 to 188.77 in the Province of Ontario, notwithstanding that such portion has not been opened for traffic according to Section 261 of the Railway Act; and rescinding Order No. 5,918, dated December 22nd, 1908.

5993—January 4—Approving by-law of Rutland R. R. Company, authorizing F. E. Barbour, G.P.A., and Geo. Cassidy, G F.A., to prepare and issue tariffs of tolls to be charged by the said railway.

5994—January 4—Authorizing the Manitoba Government Telephones to place its wires across the C.P.R. tracks at Gunton, Man.

5995—January 4—Authorizing the Water Commissioners of the Village of Merritton, Ont., to lay a 2-inch water pipe under the G.T.R. tracks where the same crosses Concession Road, Merritton, Ont.

5996—January 4—Authorizing George Collinson to place wires across the C.P.R. tracks on Broadway Street, Killarney, Man.

5997—January 4—Authorizing the Saskatchewan Government Telephones to place its wires across the tracks of the C.P.R. between the towns of Manor and Carlyle, Sask.

5998—January 8—Authorizing the C.P.R. Company to construct a branch line into the coal yard of Wm. Peters, Charles M. Peters, and Robt. Peters, situate on the north-east corner of Elizabeth and Maria Streets, East Toronto, Ont.

5999—January 4—Authorizing the G.T.R. Company to construct a branch line of railway to the mill and premises of Geo. Niebergal & Son, Lot 21, Concession 10, Township of Strong, District of Parry Sound, Ont.; and a through siding, or service track, on the C.P.R. Company's property and crossing, John and Main Streets, Sundridge, Ont.

6000—January 5—Authorizing the C.P.R. Company to operate and use the Hull Trestle, on the Eastern Division of its line in the Province of Quebec.

6001—January 4—Authorizing the city of Winnipeg to lay a sewer pipe under the tracks of the C.P.R. where the same crosses Polson Avenue, Winnipeg.

6002—January 5—Authorizing the Bell Telephone Company to place its wires across the tracks of the G.T.R. at Salisbury Street, 200 yards south of Galt, Ont.

6003—January 7—Authorizing the Erie Telephone Company to place its wires across the G.T.R. tracks at the over head bridge on Munsey Street, Cayuga, Ont.

6004—January 8—Approving revision of location of the British Columbia Southern Railway Company's line, Michel Branch, from mileage 0, 2½ miles west of Michel, thence northerly following the east bank of the Elk River, B.C.

6005—January 8—Approving location of the Canadian Northern Ontario Railway Company's line of railway through the Townships of Stratton, Barren, Niven, and White, District of Nipissing, Ont.

6006—January 18—Approving Standard Passenger Tariff, C.R.C., No. 2, on the G.T.P. Railway, to apply between its stations east of and including Edmonton, Alta., on the basis of three cents per mile.

6007—January 8—Approving location of the M.C.R.R. Company's passenger station at Welland, Ont.

6008—January 8—Approving location of the C.N.R. Company's Humbolt-Calgary line, through Townships 29 and 28, Ranges 15-21, W. 3 M., mileage 76.09 to 117.06, southwesterly from Saskatoon, Sask.

6009 and 6010—January 8—Authorizing the Bell Telephone Company to place its wires across the G.T.R. tracks 100 yards east Marshville Station, Ont., and ½ mile east Marshville Station.

6011—January 9—Authorizing the Norfolk County Telephone Company to place its wires across the G.T.R. track at the road allowance between Concessions 4 and 5, Lot 3, Township Woodhouse, County of Norfolk, Ont.

6012—January 11—Authorizing the British Columbia Southern Railway Company, at the expense of Jos. Cosovell, Moyie, B.C., to construct a crossing consisting of a plank one foot in width, fastened between the rails so that no part of it shall extend above rail level, with a plank on the outside of the rails, on each side thereof, so as to enable the applicant to cross with a wheelbarrow.

6013—January 9—Authorizing John Lortie, of Mastai, Que., to lay a 12-inch pipe under the track of the Quebec Railway, Light & Power Company, where the same crosses Lot 798, Parish of Beauport, Que.

6014—January 9—Approving by-law of the Canadian Northern Quebec Railway Company, authorizing the President, the General Freight and Passenger Agent, and the Chief Clerk in the office of the G. F. and P. A., to prepare and issue tariffs of tolls to be charged by the said company.

6015—December 18—Authorizing the Manitoba Government Telephones to place its wires across the tracks of the G.T.P. Railway Company and the C.N.R. Company, one mile west of Portage la Prairie, Man.

6016—January 9—Authorizing the G.T.R. Company to open for traffic that portion of its line of a new additional track between Hamilton and Port Dover, from a point on the main line between Hamilton and Niagara Falls, at Mary Street, to a point on Ferguson Avenue, near where the latter crosses Cannon Street, Hamilton.

6017—January 8—Authorizing the New Brunswick Southern Railway Company to construct a bridge across the Lancaster River.

6018—January 9—Authorizing the Wood Bay Telephone Company to place its wires across the tracks of the C.P.R. Company at Wood Bay, Man., on the road allowance between Sec. 30 and 31, Tp. 3, R. 10, W. 1 M.

6019—January 12—Authorizing the G.T.R. Company to re-construct bridge across the Richelieu River, at Beloeil, Que.

6020—January 12—Rescinding Order No. 5493, dated October 22nd, 1908, approving Express Class, C.R.C. No. 1, Tables and Graduated Charges C.R.C. No. 2, and Money Class, C.R.C., No. 3; and directing that the express companies at once notify their agents to apply the tariffs in existence prior to January 1st, 1909, until further Order of the Board.

6021—January 9—Authorizing the C.P.R. Company to open for traffic the grade revision of its line between Woodstock and Hartland, N.B., near Newburg Junction; and directing that the C.P.R. Company complete the fencing along said line of railway not later than the 15th May, 1909.

6022—December 29—Authorizing the C.P.R. Company to construct a public crossing at what is known as the "Gordon Lumber Company's private crossing," 231 feet west of proposed Bay Street crossing, in the town of Cache Bay, Ont.; and ordering the railway company to slope the southern side of the cut through the bluff, located 600 feet west of said crossing, from the fence to a point 3 feet above the track, the said work to be completed by the 1st June, 1909.

6023—January 4—Authorizing the Toronto & Niagara Power Company to place its wires across the tracks of the Toronto Suburban Railway Company, at the Davenport Road, County York, Ont.

6024—January 8—Authorizing the town of Oshawa, Ont., to construct a highway across the Oshawa Railway Company at Barrie Avenue, Oshawa, Ont.

6025—January 8—Authorizing the town of Oshawa to construct a highway across the line of the Oshawa Railway Company at First Avenue, Oshawa, Ont.

6026—January 9—Authorizing the city of Hamilton to lay a wrought iron sewer pipe under the track of the Port Dover branch of the G.T.R. Company, where the same crosses Sanford Avenue, in the city of Hamilton, Ont.

6027—November 25—Directing every railway company operating a railway by steam power, to equip each of its non-platform cars, as for example, ordinary box and mail or baggage cars, with the proper operating lever for uncoupling cars, and dispense with the operating wheel where in use on the ends of such cars for that purpose:

(a) In cars to be constructed in the future for use on their said railways, before they are so used.

(b) In cars under construction or in shops undergoing repairs, within 3 months from the date of this order.

(c) In cars at present in use on their respective railways, within 6 months from the date of this order.

And further directing that every railway company failing to comply with the regulations be liable to a penalty of $50.

6028—January 13—Authorizing the city of Hamilton to lay a water main under the T. H. & B. tracks at the intersection of Wentworth Street, and the Welland branch of the T. H & B. Railway Company's line.

6029—January 12—Dismissing application of Bay of Quinte Railway Company for Order settling the compensation payable by the Bay of Quinte Railway Company to the Kingston & Pembroke Railway Company in respect of running rights possessed by the Applicant Company over the Kingston & Pembroke Railway Company's line from Harrowsmith to Kingston, Ont.

6030—January 12—Dismissing application, with leave to revive if desired, of the Township of the Front of Escott, Ont., for Order directing the G.T.R. to provide and construct an overhead crossing where the railway company's line intersects at different level crossings, 2½ miles west of Mallorytown Station, the main highway from Rockfield to the village of Escott, Que.

6031—January 12—Authorizing the Commissioners of the Transcontinental Railway to cross the Temiscouata Railway at a point about 12.2 miles on the applicant's line westerly from Edmundston, N.B., or 46.62 miles from a point 2½ miles west of the town of Grand Falls, N.B.

6032—January 13—Directing that the work required by Order 5670, dated November 11th, 1908, in connection with C.N.R. crossing over property of Mrs. H. A. McLeod, of Stanley Brae, Ont., be completed by January 21st, 1909; and that the railway company be subject to a penalty of $25 for every day subsequent to the said 21st January, it shall be in default in complying with the provisions of said Order.

6033—January 13—Directing that the W. E. & L. S. R. Railway Company be subject to a penalty of $25 for each night that the light on the semaphore at the crossing of the W. E. & L. S. Railway with the M.C.R.R. on Erie Avenue, Leamington, Ont., is not lighted, on and after February 1st, 1909.

6034—January 12—Dismissing application of Calixte Franche, Wendover, Ont., for an Order directing the C.N.R. to provide a farm crossing in the middle of his lot 31, Concession 1, Wendover, Ont.

6035—January 5—Directing the St. Lawrence & Adirondack Railway Company to construct its railway across various highways in the Province of Quebec, subject to certain terms and conditions.

6036—January 14—Authorizing the Bell Telephone Company to place its wires across the M.C.R.R. tracks 3 miles east of Perry Station, Ont.

Canadian Mining Institute.—The annual general meeting of the Canadian Mining Institute will be held this year at the Windsor Hotel, on Wednesday, Thursday and Friday, March 3rd, 4th, and 5th next. The secretary anticipates that the attendance will be large, while a most interesting programme of papers has been promised. It is expected that among those who will attend the meeting will be a number of distinguished mining engineers and geologists from the United States, including Dr. F. J. Kemp, Professor of Economic Geology, of Columbia University; Dr. Heinrich Ries, of Cornell University; Dr. S. F. Emmons and Dr. W. Lindgren, of the United States Geological Survey, and others no less eminent in the mining profession.

TOWN OF MONTCALM'S WATERWORKS.

The laying of the main pipe of this system of waterworks, whose length is seven miles, has been finished last August. The work had begun in November 1907. This main pipe costs $112,000, and has been laid in the short space of nine months.

Here follow some interesting details on these waterworks, which have something new in this particular that the main is composed partly of steel pipes and partly of cast iron pipes.

"Montcalm," which is the new name of Notre Dame de Quebec, since the last provincial session, lies west of Quebec, on the high hill which follows the St. Lawrence up stream, and is in the same position as the upper town with regard to the water supply in this that the water has to be brought from the north (it is from that side too that the water is brought to Quebec). The main had to cross the valley of the St. Charles River, and has therefore to stand some one hundred pounds of pressure to the square inch, over the pressure required for domestic and fire protection purposes.

In order to stand this pressure, and besides the pressure required in case of fire, pipes were required that could stand the enormous pressure of some 215 pounds, which is equivalent to a head of over 500 feet. The engineer, Mr. Raoul Rinfret, of Montreal, proposed the use of steel pipes for pressures of over 135 pounds to the square inch, and for the other places, cast iron pipes, lead joints cannot withstand safely pressure of around 200 pounds.

The steel pipes are five-sixteenths of an inch thick, are made of mild steel and are asphalted inside and outside. They have been tested to the enormous pressure of 800 pounds to the square inch. They are joined together by the means of threaded couplings, thus avoiding the use of lead joints.

The main pipe crosses the River St. Charles. In the river the pipe line is double. By the means of a system of valves only one pipe can be used at the time if desired. The repairs could be done to the pipes only with difficulty in the river, but the supply would not be stopped if only one pipe got out of order.

The cost of the main did not go beyond the valuation made by the engineer. The municipalities know, by experience unfortunately, that this is not often the case.

Members of the Canadian Society of Civil Engineers at Port Colborne, January 29th, 1909.

SOCIETY NOTES.

The regular monthly meeting of the Canadian Railway Club was held on February 2nd at the Windsor Hotel, Montreal, when a paper on "Springs and Steel" was read by Mr. J. A. Kinkead.

Electrical Association of the Province of Quebec.

The electrical interests of Montreal have organized themselves into an association. Temporary offices have been taken in the Mechanics' Institute Building, and the organization is upon the same lines as the National Electric Contractors' Association of the United States. It is the intention of the association to submit a by-law to the Quebec Legislature aimed at raising the standard in electrical construction, and a committee has been named to draft this by-law. The officers elected for 1909 are as follows:—President, E. W. Sayer; vice-president, J. A. Valois; 1st vice-president, M. Rubenstein; treasurer, W. B. Shaw; secretary, W. A. Stanley; executive committee, C. J. Young, J. G. Brock, J. A. Lachapelle, J. A. St. Amour, N. Simoneau, C. G. Matthews, Lacasse Rousseau.

RECENT FIRES.

MONTREAL.—A despatch from Winnipeg, of January 6th, says that at midnight, Jan. 5th, fire broke out in the big warehouse of Messrs. James Ballantyne & Compnay, contractors and power supplies, whose headquarters are in Montreal. The building was gutted, but all papers were saved. Loss, $50,000, fully covered by insurance.

NORTH BAY.—Fire broke out at 6 o'clock on February 3rd in the T. & N. O. Railway Station at Temagami, and this handsome structure, completed about a year ago at a cost of $15,000 is in ruins, only the massive stone walls standing.

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.

New Brunswick.

CENTREVILLE.—Tender for Centreville School Building will be received at the office of the secretary of the School Trustees, Centreville, N.B., until Monday, the 8th day of February, at noon, for the building and completing ready to occupy, a school building in Centreville according to plans and specifications to be seen at the school secretary's office or at the office of the architect, H. H. Mott, St. John, N.B. Address, H. J. Clark.

WOODSTOCK.—The building committee of the municipality of Carleton will receive plans, specifications and cost of plans and estimates for the building of a brick Court House in the town of Woodstock during the summer 1909. Said tenders to be addressed to the undersigned. Tenders to be received up to February 20th, 1909. Henry A. Phillips.

Ontario.

BRANTFORD.—Tenders will be received until Thursday, February 11th, for the furnishing and laying of about 2,250 feet of 12-inch sewer pipe and 635 feet of 12-inch cast iron pipe. T. Harry Jones, City Engineer. (Advertised in the Canadian Engineer.)

MARKHAM.—Tender for hot water heating system, Markham, Ont., Postoffice, will be received at this office until 4.30 p.m. on Friday, February 12th, 1909, for the work mentioned. Plans and specifications to be seen on application to Mr. David Mayer, Clerk of Works, Postoffice, Markham, Ont., and at the Department of Public Works, Ottawa, where all necessary information can be obtained. By order, Napoleon Tessier, Secretary.

OTTAWA.—Tenders will be received until February 12, 1909, for the construction and erection of a reinforced concrete grand stand on the Ottawa fair grounds. E. McMahon, secretary.

OTTAWA.—Tenders for shops, will be received at the office of the Commissioners of the Transcontinental Railway at Ottawa, until 12 o'clock noon, of the 10th day of March, 1909, for the construction and erection complete, in accordance with the plans and specifications of the Commissioners, of shops east of Winnipeg. Plans, details and specifications may be seen at the office of Mr. Hugh D. Lumsden, chief engineer, Ottawa, Ont., and Mr. S. R. Poulin, district engineer, Winnipeg, Man. P. E. Ryan, Secretary.

OTTAWA.—Sealed tenders addressed to Howard Douglas, Esq., Commissioner of Parks, Banff, Alberta, will be received up to 12 o'clock noon on the 5th February, 1909, for the following sewer pipe and fittings required for extensions to the Banff sewerage system: 282 feet of 8-inch sewer pipe; 1,810 feet of 9-inch sewer pipe; 600 feet of 15-inch sewer pipe; 30 6-inch off 15-inch sewer junctions; 60 6-inch off 9-inch sewer junctions. The whole of the material to be delivered f.o.b. cars at Banff, Alta., on or before the 1st April, 1909. P. G. Keyes, secretary, Department of the Interior.

ST. THOMAS.—Tenders for garbage disposal are being asked by the board of health in order that a cost basis may be arrived at and a better scheme than that already offered proposed. Before the matter is finally dealt with the City Engineer will look into the systems in other cities.

WINDSOR.—Sealed tenders will be received by the undersigned up till noon on the 9th day of Feb., instant, for the under-mentioned machinery, delivered and erected ready for operation, in the Electric Light Works of the city of Windsor, namely: 72-in. by 18-ft. steel boiler ,without front, but with grate bars and 4-inch tubes, to carry 140 lbs. steam pressure. 84-inch by 18-foot steel boiler, complete, with full front and all fixtures, 4-inch tubes, to carry 140 lbs. steam pressure. 250 horse-power tandem or cross-compound engine, 200 to 250 revolutions per minute. Stephen Lusted, city clerk.

Manitoba.

WINNIPEG.—Sealed tenders addressed to the Chairman of the Board of Control, for supply of 120 feet of 26-in. 8-ply rubber elevator belting delivered to the City Quarry, Stony Mountain, will be received at the office of the undersigned up to 11 a.m. on Thursday, February 11, 1909. M. Peterson, secretary.

WINNIPEG.—Tenders, addressed to the Chairman of the Board of Control, for the undermentioned supplies for the Street Commissioner's Department, will be received at the office of the undersigned up to 11 a.m., on Monday, February 8th, 1909, namely:—250 asphalt scrapers, to sample; 250 16-in. bass brooms, to sample; 200 hoes, blades 5 in. by 14 in., double prong, to sample; 600 ft. 1½-in. rubber hose; 4 dump wagon boxes, 4-yard capacity. All of the above goods to be supplied not later than March 15th, 1909. M. Peterson, Secretary.

Alberta.

CALGARY.—Tenders will be received until February 18th, 1909, for boiler and generators to be supplied to the Commissioners at Calgary. H. E. Gillis, City Clerk. (Advertised in the Canadian Engineer.)

CALGARY.—Tenders will be received until February the 18th, 1909, for supplying 1,143 tons (approx.) steel rails, together with fasteners; also steel span wire, cedar poles, trolley wire, etc., for street railway. H. E. Gillis, City Clerk, (Advertised in the Canadian Engineer.)

LETHBRIDGE.—Tenders will be received until March 1st, 1909, for a Municipal Power Plant at Lethbridge. Fuller particulars will be found in the advertisement in The Canadian Engineer. George W. Robinson, Secretary.

Saskatchewan.

SASKATOON.—Sealed tenders will be received by the municipality until February 24th, 1909, for a pumping engine with a capacity from 1,200 to 1,500 United States gallons per minute. J. H. Trusdale, Secretary-Treasurer; Willis Chipman, Chief Engineer. (Advertised in the Canadian Engineer).

British Columbia.

VICTORIA.—Sealed tenders, for wrought and cast iron, per pound, will be received by the undersigned until the 8th day of February, for the manufacture and delivery, f.o.b., cars at Revelstoke, all the ironwork for the Columbia River bridge as called for in the Bills of Iron and Drawings exhibited. Specifications, drawings, bills of iron, forms of contract and tender, may be seen at the office of the Public Works Engineer, Victoria, B.C.; the office of the Provincial Timber Inspector, Vancouver, B.C.; and at the office of the Government Agent, Revelstoke, B.C. F. C. Gamble, Public Works Engineer, Department of Public Works, Victoria, B.C.

VICTORIA.—Sealed tenders will be received by the Hon. the Minister of Public Works, until February 8th, for the erection and completion of a bridge across the Columbia River at Revelstoke, B.C. Drawings, specifications, and conditions of tendering and contract may be seen at the Department of Public Works, Victoria, B.C., at the office of the Provincial Government Timber Inspector, Vancouver, B.C., and at the Government Office, Revelstoke, B.C. F. C. Gamble, Public Works Engineer, Department of Public Works, Victoria, B.C.

Foreign.

ADELAIDE, AUSTRALIA.—Tenders addressed to the undersigned will be received until April 28th, for the supply

of one bucket dredger, one tug, and two hopper barges. Address, Engineer-in-Chief's Department, Adelaide, South Australia.

LA PALOMA, URUGUAY.—Tenders addressed to the undersigned will be received until April 2nd, for the construction of a port. Ministerio de Obras Publicas, Monte Video.

LEIPZIG, GERMANY.—Tenders addressed to the undersigned will be received until March 15th for a supply of pumps for the New Waterworks. Stadtverorducten, Leipzig.

CONTRACTS AWARDED.

Ontario.

LINDSAY.—The contract for the building of the dam, bridge and lock at Lindsay upon which several Peterboro contractors tendered, has been let to Mr. J. Ritchie, a Western Ontario contractor. It is understood that the amount of the contract is between $40,000 and $50,000. Work will be commenced upon the contract as soon as weather conditions will permit.

PORT ARTHUR.—Beagle and Hourigan have secured the contract for the dredging to be done at Rainy River. This contract was let by the Government to the Great Lakes Dredging Company.

SAULT STE. MARIE.—O'Boyle Bros'. Construction Company, have the contract for erecting a dry dock here, which will accommodate the largest boats on the lakes. The dock will be 620 feet long, and will cost half a million. Work wi'l be commenced early in the spring.

WELLAND.—M. Beaty & Sons, who are finishing a dredge for W. L. Phin, have just received an order from the Dominion Dredging Company for the largest dredge they have ever built. It is for work on the Atlantic Coast, and will be able to work under forty feet of water and lift ten tons of earth at once.

British Columbia.

VANCOUVER.—The contract for the construction of a 13-story office building has been awarded to the Dominion Bridge Company, of Montreal. Work is to commence April 1st, 1909, and the building is to be complete April 1st, 1910.

Foreign.

GRAND RAPIDS, MICH.—The Buffalo Forge Company have a contract with the city to supply ten sewage pumps having a capacity of over 250,000 gallons per minute. The pumps are to be placed in three stations, one station to contain two 18-inch. pumps, second to contain 24-inch. pumps, and third to contain two 24-inch. pumps, and the fourth station to contain 40-inch. pumps. Westinghouse furnishes electrical equipment on a separate contract. The ten pumps together without motors will weigh approximately 200,000 lbs.

LIGHT, HEAT, AND POWER.

Quebec.

MONTREAL.—St. Maurice Hydraulic Company are applying to Parliament for an act confirming the letters patent incorporating the company, increasing its capital stock and for the purpose of giving powers to the company to purchase and build dams across the rivers and lakes within the districts and counties therein mentioned; to charge tolls for the use of dams and all works and improvements done and made by the company; to acquire all rights and lands necessary for the purpose of the company.

Ontario.

LONDON.—Negotiations opened and are still continuing for the taking over of the plant of the London Electric Company, valued at $500,000, by the city in order that the company may not be a competitor of Niagara power. The company have intimated that if their plant is not purchased they will bring power from the Cataract Company of Brantford, and compete with the city.

OTTAWA.—J. A. Ellis, secretary of the Municipal Electric Commission at Ottawa, asserts that the reports of the operation of the civic light and power plant for 1908 would show a gross revenue of $105,000, and a net profit of $15,000, after providing for interest and sinking fund. The $15,000 will be set aside to meet the expense of depreciations and renewal of plant. The result was obtained after the adoption of rates, which were about half those in force in the past, and while a private company operated successfully in the city.

OTTAWA.—In view of the very large development of water power which will result from the completion of the Trent Valley Canal across the Province of Ontario, from the Georgian Bay to Lake Ontario, the Minister of Railways and Canals has thought it well that a policy should be laid down will ensure the sale of this power to individual users at reasonable rates. Where power from the Trent Canal therefore is being sold to the public in electric energy or other form, power is being placed in the hands of the Board of Railway Commissioners to regulate the prices which the public will have to pay for it. This will apply to existing power works as well as to those which are established hereafter.

MERRITTON.—The new municipal electric lighting system here is now completed and commenced operation on January 29th. Current is obtained from the Ontario Power Company on a long term contract by the town. The town purchased the former electric lighting distribution system and overhauled it and added considerable extensions. The feature of the new combined system is the introduction of Tungsten street lamps, and their control entirely from the receiving station itself by automatic means. This multiple Tungsten system operated by distant control is an entire novelty in municipal lighting and especially adapted for towns where cost of copper and of yearly operation must be kept down. On the occasion of turning on the street lighting system the Town Council invited a number of officials of adjoining towns to see the system and lighting display which was described as brilliant, as street lighting goes, there being 400 Tungsten lamps on the streets. The adaptation of this system to street lighting required the introduction of specially designed apparatus and controlling devices. Messrs. K. L. Aitken (now City Electrical Engineer of Toronto) and P. H. Mitchell, Consulting Engineer, Traders Bank Building Toronto, designed and supervised the installation.

PETERBORO.—The Water Commissioners are seeking permission to go to the people with a by-law seeking authority to borrow $120,000 for the purpose of erecting a new dam, a new power-house and a new pumping plant. The whole equipment will be strictly modern in every detail, and will last for many years. The pumping capacity will be trebled. 1,200 electric horse-power will be developed, 500 horse-power will be used by the Commissioners, and 700 will be available for the city.

TORONTO.—Arrangements have been made to enlarge the present quarters of the Hydro-Electric Commission in the Continental Life Building until the new quarters in the Parliament Buildings are ready. The construction department will probably be moved shortly to Hamilton to superintend the work of building the power transmission lines. Changes and extensions of the staff are under consideration and may take place shortly. It is proposed to have two main departments, an engineering and accountant's. The first will have its head to take charge of the mechanical portion of the transmission lines, make reports on new power schemes, etc. At Hamilton or Dundas will be situated what may be known as the "chief operator's" department. Over all will be a head, whether the present Hydro-Electric Commission of three members, or a Minister, the future alone can decide. The present indications are that the Commission will remain as it is, with three members.

Alberta.

EDMONTON.—The electric lighting plant and system of the Edmonton Electric Light Company, with a capacity of 1,500 lights was purchased for $13,500 and taken over by the town of Edmonton in May, 1902.

EDMONTON.—A big power scheme is now being considered by the city. It is proposed to use the water power at

Grand Rapids on the Athabaska River, 150 miles north-west of the city, to generate electricity for the use of the city. At Grand Rapids there is a fall in the water of 140 feet in a distance of 600 feet. Here could be obtained electric power to the extent of 250,000 horse-power, which would meet the needs of Edmonton, Strathcona, Fort Saskatchewan, Leduc, Wetaskiwin, and other towns. At the present time the above mentioned towns use 15,000 horse-power. It is estimated that it would cost $1,500 a mile to build a conducting line for the 150 miles.

Saskatchewan.

REGINA.—Statistics given out by the Electric Department show the increase in energy used during recent years

	1905.	1906.	1907.	1908.
Total output in K.W. hours.	277,198	486,768	833,039	926,237
Consumers of energy	249	656	1,008	1,297
Lamps in use	8,500	12,649	20,058	24,513
Meters in use	191	465	880	1,196
Street lamps in use	29	54	67	72
Motors in use	0	15	40	56
Motors aggregate h.p. ..		80	150	252.75
Maximum loan on station in K.W.	201.95	340	450	525
Daily output K.W. hours..	1,634	3,145	3,717	4,566

Foreign.

DETROIT, MICH.—Important changes in the operation of the Michigan Central Railway have been decided upon, involving the electrification of all the road's terminals here, and the main line as far west as Ypsilante, which is 30 miles from Detroit. Electric power will be generated by water-power of the Huron River at Chelsea, Mich.

LAWRENCE, MASS.—Through the office of Charles T. Main, of Boston, the designing engineer, the Pacific Mills have recently placed orders for additional power house equipment as follows: With the Allis-Chalmers Company for a steam turbine with turbo jet condenser and generator of 3,250 KW. capacity and additional exciter and switchboard apparatus. With the Bigelow Company for twelve additional horizontal return tubular boilers, of practically the same size as those contained in the first installation. These boilers will be supplied with superheaters. The buildings are of sufficient size to contain all of this new apparatus, which completes the unit of station which has been planned for and built. Another chimney will be built of the same size as the one recently erected, namely 200 feet high and 9 feet diameter inside the core.

SEWERAGE AND WATERWORKS.

Manitoba.

WINNIPEG.—H. N. Ruttan, city engineer, has prepared a comprehensive report on the water softening question, in which he recommends that the old softening plant at well No. 2 be rearranged to provide a capacity of 5,000,000 gallons; that a new plant with 5,000,000 capacity be built at well No. 5; that a third plant of 2,000,000 gallons' capacity be located at well No. 6. The cost of providing the three plants would be $150,000, while the cost of softening 6,000,000 gallons of water, the daily consumption in the city now, would be $58,150. The latter figure includes items for maintenance, sinking fund and interest, as well as the actual cost of operation. Softening to capacity, 12,000,000 gallons, the cost of the operation would, of course, be considerably reduced when the increased quantity is taken into consideration. A cost of $58,150 for softening 6,000,000 gallons of water daily amounts to 2.6 cents per 1,000 gallons. For the average house the cost of softening would not exceed one-half cent per day. The cost of softening was formerly from 3 to 4 cents per 1,000 gallons.

RAILWAYS—STEAM AND ELECTRIC.

New Brunswick

CAMPBELLTON.—The railway from Campbellton to St. Leonard's will likely be ready for traffic by August. Over sixty miles of track have been laid, while nearly fifty have been graded.

MONCTON.—Work on the G.T.P. in New Brunswick has been very little interrupted by winter weather. An average of nearly four thousand men, with 653 horses, were at work during December.

ST. JOHN.—Notwithstanding the wintry weather, construction work on the Grand Trunk Pacific in all the sections in the province is being pushed forward. With the exception of a mile or two, the right of way for the 255 miles through New Brunswick is all cleared. Much grading has been done and several long sections of track have been laid.

Ontario.

NORTH BAY.—Two C.P.R. survey parties left February 4th, one from Sturgeon Falls and one from Warren, to survey the Sturgeon River Valley route to Gowganda for the proposed extension which will connect with the Toronto-Sudbury line north of Byng Inlet.

OTTAWA.—An important reorganization of the Railway Commission is announced by which the Dominion is divided into districts, each in special charge of one of the commissioners as to routine applications. Chief Commissioner Mabee will, of course, have a general supervision over each district. The Province of Ontario, with the exception of Port Arthur and the district west thereof, is placed under the immediate jurisdiction of Mr. D'Arcy Scott, the Assistant Chief Commissioner, and he will be assisted by Inspectors James Ogilvie and James Clarke. The Provinces of Quebec, New Brunswick, Prince Edward Island and Nova Scotia are allotted to Hon. M. E. Bernier, who will be assisted by Mr. E. C. Lalonde, inspector. Commissioner S. J. McLean takes charge of Manitoba, Saskatchewan, and that portion of Ontario west of Port Arthur, with Mr. W. S. Blythe, of Winnipeg, as inspector. Alberta and British Columbia will be looked after by Commissioner Mills, assisted by Inspector M. J. McCaul.

TORONTO.—As soon as the weather opens up, construction will be commenced on an extension of the C.N.R. from Sellwood, Ontario, west along the Vermilion River, keeping north of the Canadian Pacific to Port Arthur.

TORONTO.—The Temiskaming and Northern Ontario Railway Commission have practically decided to extend the Earlton branch Government railroad to Elk City, the new silver mining town, at an estimated cost of $750,000. The company will probably extend later to the Gowganda silver fields, 28 miles distant.

TORONTO.—During the coming year the Temiskaming and Northern Ontario Railway will probably construct a branch leading into the newly discovered Gowganda silver country. Mr. J. H. Black, general superintendent of that road, was in Montreal last week, and stated that the Ontario Railway Board had taken the matter up, and was giving it consideration. Whether the road will be built or not depended entirely upon the facts placed before the Board, as to whether the new district would be likely to furnish permanently paying business.

TORONTO.—Michael A. Piggott, of Hamilton; Hubert E. Larkin, and Alexander Sangster, of St. Catharines, trading as M. A. Piggott & Company, contractors, are suing the Guelph & Goderich Railway Company, claiming $523,574.75 and interest, for work done, materials supplied, and expense incurred pursuant to contract, and they claim damages for breach of contract. Plaintiffs claim that extra work and extra haul were ordered by defendants in excess of what was originally agreed upon. Work was completed August 20th, 1907, and accepted by defendants, being approved by their Chief Engineer, P. A. Peterson. The original claim was for $1,117,115.66 and interest, on which defendants have paid $593,540.91, repudiating liability for balance, except for less than $100,000 not yet paid, and which they have refused to pay except on condition that plaintiffs accept it in full of all claims. Defendant company relies upon provisions of contract, and says plaintiff did not construct work within time limited thereby, and that they have not yet completed it; also, that all progress certificates issued by the chief engineer have been fully paid, and that final certificate has not yet been

given. They deny the claim of extras, and counter-claims for loss and damage by alleged failure to complete work according to contract for $250,000.

Manitoba.

WINNIPEG.—Through trains from Winnipeg to Fort William, via the National Transcontinental Railway, will probably be running by August 31st next. At an outside estimate the steel laying will be finished by June 30th, and all that will be left will be the grading and surfacing of the new track to fit it for handling the heavy trains. At the present time 110 miles of steel have been laid east from Winnipg, and construction trains are being operated over it. The track is in excellent shape for the greater part of the distance. To Rennie, where the N.T.R. crosses the C.P.R., all that is needed is ballasting to put the track in first-class condition for traffic, and east from there the steel is being laid with all possible speed. Within two weeks it is expected the steel will be at the Winnipeg River crossing.

British Columbia.

GOLDSTREAM.—A hydraulic plant will be installed and water taken from Waugh Creek, will be played on the cliff on the E. & N. Railway here, to wear down loose stones and mud which have caused much annoyance and many interruptions in the service of late.

VANCOUVER.—Rumor has it that the British Columbia Electric Railway Company contemplate securing the two great water powers of the Fraser Valley, the Stave Lake Falls, near Ruskin, and the Vedder Falls, near Chilliwack, and then to build a great belt line of which the new Chilliwack line will be but one half. It is also stated that the company has already secured the rights of laying track on the Dewdney Road and as soon as the Stave Lake power is obtained a track will be built along the north side of the river to connect by a bridge at Harrison up to the Chilliwack line.

VICTORIA.—The British Columbia Electric Railway Company have ordered six new cars of the latest type, which will necessitate changes and extensions in the tracks.

VICTORIA.—D. D. Mann, of Mackenzie, Mann & Company, was in Victoria recently in connection with the extension of the Canadian Northern Railway to the Pacific Coast which is being taken up with the Provincial Governments.

BONNINGTON FALLS.—The C.P.R. is conducting experiments with a view to electrifying its western lines. It is proposed to commence on the mountain lines, utilizing the water-power that is running to waste on the eastern slope of the Rockies. But freezing causes a great diminution of this power in the winter, and the question is whether what is left would prove sufficient to operate the main line during the winter season.

Foreign.

PITTSBURG, PA.—The Pennsylvania Railroad Company announced that it had placed orders for cars to the amount of $2,225,000 with the Cambria Steel Company, Pressed Steel Car Company, Standard Steel Car Company, and the American Foundry Company. The order is for 2,225 cars at an average cost of $1,000, and is but one half of the order which the company intend placing, according to the authorized statement of President James McCrea in Pittsburg some time ago. The order announced yesterday is for the lines west. The additional order which will be for the lines east of Pittsburg, will likely be placed next week. The railroad company apportions 1,000 cars of yesterday's order to its own shop—the Cambria Steel Company—and the rest is equally divided between the other three companies. This, with the $2,000,000 worth of cars ordered by the Vanberbilt system for the Pittsburg & Lake Erie Railroad in the Pittsburg district some time since, makes $4,225,000 worth of cars to be made here hurriedly.

FINANCING OF PUBLIC WORKS

Saskatchewan.

REGINA.—The Saskatchewan Government has put through a measure allowing power to borrow another half million to pay for public improvements such as steel bridges, main roads, ferries, etc., out of capital account.

CURRENT NEWS.

Ontario.

OTTAWA.—The Dominion Government have brought down their estimates, and although there is some curtailment yet the vote is large.

The new vote for the Intercolonial Railway includes $52,000 for increased accommodation at Truro, $50,000 for a cut-off line at Moncton, $180,000 to increase the accommodation at Halifax, $400,000 for locomotive and car shops at Moncton, $100,000 to increase accommodation and facilities along the line, $50,000 for improvements at Campbellton, and $100,000 for rolling stock.

For the Prince Edward Island Railway there is an appropriation of $194,000 to increase accommodation at Charlottetown.

Twenty million dollars is asked for the National Transcontinental Railway, as compared with thirty millions last year, and for the survey of the Hudson's Bay Railway $65,000 is asked. The Trent Valley Canal comes in for another million dollars, the same as last year.

To provide for expenses in preparing plans for the reconstruction of the Quebec Bridge the sum of $150,000 is asked.

Under the head of public works the following are the larger items: To complete the new Victoria Memorial Museum at Ottawa, $400,000.

For Port Arthur and Fort William harbour improvements, $600,000.

Improvements at St. Andrew's Rapid's, Winnipeg, $600,000.

Improvements in St. John harbour, $475,000.

Tiffin harbour improvements, $125,000.

Victoria harbour, $150,000.

For the survey of the proposed twelve-foot waterway between the St. Lawrence and Lake Champlain via the Richelieu and Yamaski Rivers a vote of $20,000 is asked; for the St. Lawrence ship canal the vote is $800,000, an increase of $40,000.

For harbours and rivers in Ontario the following are among the new votes asked:—

Burlington channel, piers, reconstruction, $50,000.

Cobourg, extensions of breakwaters, dredging, etc., $60,000.

Goderich harbour, repairs to piers, etc., $5,350.

Harbours, rivers and bridges, general repairs and improvements, $25,000.

Little Current, improvement of northern channel in Georgian Bay, $28,000.

Port Stanley, harbour improvements, $38,000.

River St. Lawrence, improvement of Canadian channel between Kingston and Brockville, $75,000.

Rondeau harbour improvements, $25,000.

Sault Ste. Marie wharf, dredging approaches, $55,000.

Toronto harbour improvements, $375,000.

ST. THOMAS.—At the suggestion of the local Commissioners, the Southwestern Traction Company made an offer for the lease of the city's street railway, which has been going behind financially, last year about $12,000. The company offered to take over the road, give a satisfactory service and reduce the deficit about one-half, provided the city expends about $12,000 to $15,000 on improvements and continues to keep up the rolling stock and roadbed. This was not acceptable to the local management.

ST. THOMAS.—Engineer Bell's report to the County Council contains a list of the bridges constructed this year; also the wooden bridges still left in the county. The new bridges and the cost of each are, the Queen's Bridge between city and county, entirely finished cost $9,433.70; Brewery Bridge $10,302.02; Bothwell Bridge, repaired, the county cost 27½ per cent., $557.36; Otter Bridge near Tillsonburg has also been completed but as yet has not been inspected. The wooden bridges left at the Corn Road Bridge over the Thames; Gillett's Bridge over Catfish Creek, Yarmouth; Belmont Bridge between Elgin and Middlesex; Filmore

Bridge over Catfish Creek in Bayham; Port Burwell Bridge over Catfish Creek; Jamestown Bridge over Catfish Creek; Dodd's Bridge, Southwold, over Kettle Creek, and several smaller ones, because of their length are not much in danger of them not supporting the weight of a traction engine. It will be absolutely necessary, he states, to build the Jamestown Bridge, while in the others the Council will have to use their own judgment. They are strong enough for ordinary traffic but not for traction engines.

MISCELLANEOUS.

New Brunswick.

SACKVILLE.—At a meeting of marsh owners in Middle Sackville, the question of how best to drain the marsh canals was considered. The draining of the Goose Lake Canal, the Log Lake Canal, and the Floating Canal was the particular phase of the subject to which attention was given, the suggestion being to clear the canals by means of dredging. The idea is that if possible authority be given the marsh commissioners to purchase a dredge which could be operated as needed.

Ontario

PETERBORO.—The Peterboro Lubricator Manufacturing Company are making rapid progress in the installation of new machinery. Their most recent installation consisting of two large presses for pressing out the steel parts of the cups. Mr. Wm. Harstone is president of the company, and Mr. Boeroma, managing director.

TORONTO.—In Toronto the prospect for the building trades this year is good, in so far as amount of work promised goes. The city architects' department is preparing plans for various new municipal buildings. Among these are new fire hall and police station at East Toronto, and fire hall on Perth Avenue, and an addition to the main pumping station. Then there is the General Hospital and the additions to Western and Isolation hospitals, some University buildings and a technical school, several warehouses and many dwellings.

PERSONAL.

MR. J. K. MACNEILLIE, superintendent of division number one of the C.P.R. at Toronto, has been transferred to London, Ont.

MR. A. W. SWAN, who built Bristol docks, has been appointed resident engineer of Montreal harbour. Mr. Swan is a Scotchman.

MR. GEORGE A. SCOVILLE has been appointed assistant superintendent of buildings and grounds at the University of Toronto.

MR. W. HOLLINGSWORTH, who has been for several years in the Sewers Department, City Hall, has been appointed assistant engineer-in-charge of construction of section No. 3 of the Trunk Sewer.

MARKET CONDITIONS.

Toronto, February 4th, 1909.

A somewhat active recent demand for stock pine boards has lessened the supply, much of 12-inch going to South America, and the price is advanced. Demand is rather more pronounced for hemlock and spruce, as affording cheaper material for house-building. There is something resembling a flurry in copper, tin, and zinc in outside markets, but nothing definite enough to cause a change in quotations here. Nor can we announce any real activity here in these metals. Pig-iron and steel are unchanged, and rather dull. In other building materials general dullness seems to prevail.

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

Antimony.—Partakes somewhat of the greater strength that characterizes all metals this week. Not much selling, however. Price as before, 9 3-4c.

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

Boiler Plates.—1-4 inch and heavier, $2.40. Boiler heads 25c. per 100 pounds advance on plate.

TENDERS CALLED FOR

CITY OF LETHBRIDGE, ALBERTA, CANADA

Tenders for Municipal Power Plant

Specifications, drawings and form of tender may be obtained from the Secretary-Treasurer, City of Lethbridge, Alberta, on and after the Fifteenth day of January, 1909. The following are the sections issued:

A. Boilers and Accessories.
B. Economizer.
C. Feed Pumps.
D. Mechanical Draft.
E. Pipe work and Valves.
F. Steam Turbine Generator
G. Steam Engine Generator.
H. Re-erection of Steam Engines.
I. Condensing Sets.
J. Crane.
K. Switchboards, &c.
L. Motor Generators & Transformers.
M. Buildings Steel Work, &c.

Tenders on any or all of the above sections, or any combination of the above sections will be received.

Tenders to be enclosed in a sealed envelope addressed "Tenders for Electric Plant" and to be delivered to the undersigned at the City Hall, Lethbridge, on or before the 1st day of March, 1909, and to remain open for acceptance for two (2) calendar months from that date.

Each tender must be accompanied by a certified cheque payable to the Secretary-Treasurer of the City of Lethbridge for 10% (Ten per cent.) of the amount of the tender, which will be returned to the tenderer, unless he fail to enter into contract for the work at the rate stated in the tender.

Plans and specifications may also be seen at the offices of Messrs. Smith, Kerry & Chace, Confederation Life Buildings, Toronto, Ontario, and the Carnegie Public Library Building, Winnipeg, Manitoba. The lowest or any tender not necessarily accepted.

A deposit of $10.00 (Ten dollars) will be required for use of plans and specifications, which will be returned upon letting of contracts.

GEO. W. ROBINSON,
Secretary-Treasurer.

CITY OF SASKATOON

Province of Saskatchewan.

TENDER FOR PUMPING MACHINERY.

SEALED TENDERS will be received by the City Clerk until

8 P. M. on February 24th, 1909,

for furnishing and erecting one Pumping Engine with a capacity of 1,200 to 1,500 U. S. Gallons per minute.

For further particulars address the Chief Engineer..

Wm. Hopkins, Esq., Mayor, Saskatoon, Sask.
J. H. Trusdale, Esq., Secretary-Treas., Saskatoon, Sask.
Willis Chipman, C.E., Chief Engineer, 103 Bay Street, Toronto, Ont.

Boiler Tubes.—Orders continue active. Lap-welded, steel, 1 1-4-inch, 10c.; 1 1-2-inch, 9c. per foot; 2-inch, $8.75; 2 1-4-inch, $10; 2 1-2-inch, $10.60; 3-inch, $11.75 to $12; 3½-inch, $15; 4-inch, $18.50 to $19 per 100 feet.

Building Paper.—Plain, 30c per roll; tarred, 40c. per roll. Business seasonably quiet.

Bricks.—Common structural, $9 per thousand, wholesale, and the demand moderately active. Red and buff pressed are worth, delivered, $18; at works, $17.

Cement.—Market still weak; cement can be had in 1,000 barrel lots at $1.70 per bbl., including the bags, which is equal to $1.30 without bags. At this time of year building operations are closing down, demand is therefore naturally limited.

Coal Tar. Season about over, price still $3.50 per barrel.

Copper Ingot.—We do not change our quotation from 15c .to 15 1-2c. Outside markets show a disposition to advance, and there is some feverish movement.

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

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

Roofing Felt. Very limited request. Price $1.80 per 100 pounds.

Fire Bricks.—English and Scotch, $30 to $35; American, $27.50 to $35 per 1,000. Moderate demand and fair supply.

Fuses—Electric Blasting.—Double strength, per 100, 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. Bennett's double tape fuse, $6 per 1,000 feet.

Galvanized Sheets—Apollo Brand.—Sheets 6 or 8 feet long, 30 or 36 inches wide; 10-gauge, $3.05; 12-14-gauge, $3.15; 16, 18, 20, $3.35; 22-24, $3.50; 26, $3.75; 28, $4.20; 20, $4.50; 10¾, $4.50 per 100 pounds. Fleur de Lis—28-gauge, $4.30; 26-gauge, $4.05; 22-24-gauge, $3.50. Queen's Head—28-gauge, $4.50; 26-gauge, $4.25. Sheets are in very active request.

Iron Chain.—¼-inch, $5.75; 5-16-inch, $5.15; ⅜-inch, $4.15; 7-16-inch,

CITY OF CALGARY

TENDERS will be received by the Commissioners of the City of Calgary and addressed to the unde-signed marked "Tender for St. Railway material," until the 18th day of February next, 12 o'clock noon, for supplying to the City the following:

Covering approximately:—

397 Long tons 80-pound A. S. C. E. Steel rails.
746 Long tons 60-pound A. S. C. E. Steel rails.
Together with certain special work, also spikes, bonds, Tie plates.
Angle irons, track bolts, ties etc.
12 standard street railway cars.
One street railway sprinkler.
One street railway sweeper.

Overhead Construction.

Steel span wire poles 30 ft. and 35 ft., three sections.
Cedar poles.
12.5 miles of 2.0 trolley wire.
10.2 miles of 3.0 feed wire.
Span wire.
Hangers, Insulators and Conical strain insulators.
Ears.
Cross-overs and trolley frogs.

Bids will be received upon the entire schedule or any item of the same. A marked cheque covering 5 per cent up to $10,000 and 2½ per cent over and above this sum of the amount bid will be required to accompany each and every tender.

Full particulars and specifications will be supplied at the City Engineer's Office.

The lowest or any tender not necessarily accepted.

H. E. Gillis,,
Dated at Calgary, Jan. 20th, 1909. CityClerk.

CITY OF BRANTFORD

SEWER EXTENSION.

Sealed tenders addressed to John Moffat, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received till 12 o'clock Noon on

THURSDAY, FEBRUARY 11TH, 1909,

for the furnishing and laying of about 2,250 feet of 12-inch extra strength sewer pipe and 635 feet of 12-inch cast iron pipe, together with 11 manholes—greatest cut 32 feet—average cut 17½ feet.

Plans and specifications may be seen and instructions to biders and forms of tender obtained at the City Engineer's Office.

Each tender must be accompanied by a marked cheque for five per cent. of the amount of the tender.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer's Office, City Engineer.
Brantford, January 18th, 1909.

CITY OF CALGARY

TENDERS will be received by the Commissioners of the City of Calgary and addressed to the undersigned, marked "Tender for Boiler and Generator," until the 18th day of February next at 12 o'clock noon, for supplying to the City the following:

3 Water Tube Boilers equivalent to 1,000 H. P., with piping and induced draft system for 2,500 H. P.

Also

1 500 K.W. Generator connected to a 750 H. P. High Speed Engine for Railway System, with condenser, switch board, etc.

A certified check on a chartered bank in Canada for 2½ per cent. of the amount must accompany each tender. Separate offers may be made for any of the items set out herein.

Plans and Specifications can be had on application to the City Engineer, Calgary, Alta.

The lowest or any tender not necessarily accepted.

H. E. Gillis,
Dated at Calgary, Jan. 20th, 1909. City Clerk.

CONTRACTOR'S SUPPLIES

To know where to look for what you want, to know where to dispose of what you don't want is a great convenience. You require special equipment. This department will enable you to get in touch quickly with reliable men who wish to dispose of that which you require. Whether a buyer or a seller, you will find this department an aid to business.

RATES FOR THIS DEPARTMENT ARE VERY SPECIAL. BETTER SEND FOR THEM.

FOR SALE

CONTRACTORS' MACHINERY.

1, 10" x 12" double cylinder, single drum hoisting engine without boiler.
1, 8" x 10" single cylinder, single drum hoisting engine without boiler.
1, 7" x 12" double cylinder, double drum steam hoist with boiler.
4, 7" x 10" double cylinder, double drum steam hoists with boilers.
1, 7" x 8" single cylinder, single drum hoisting engine without boiler.
1, 6½" x 8" double cylinder, single drum hoisting engine without boiler.
1, 5¼" x 7" double cylinder, double drum steam hoist with boiler.
1, 5" x 7" double cylinder, single drum hoisting engine without boiler.
1, 5" x 7" single cylinder, single drum steam hoist with boiler.
1, 9" x 10" Abell semiportable engine and boiler.
1, 8" x 12" semiportable engine and boiler.
2, 7" x 10" Champion portable engines and boilers.
1, 7" x 10" Victor portable engine and boiler.
1, 7½" x 12" Russell traction engine.
1, 7" x 10" Cornell traction engine.
1, 48" x 20' semiportable fire box boiler.
2, 44" x 18' semiportable fire box boilers.
1, 39" x 14' 8" semiportable fire box boiler.
1, 36" x 12' 11" semiportable fire box boiler.
1, 48" x 10' 9" semiportable return tube boiler.
1, 30" x 12' semiportable return tube boiler.
1, 30" x 10' semiportable return tube boiler.
1, 10" x 10" x 10" steam driven air compressor.
1, 6" x 6" vertical, double cylinder air compressor.
1, 6" x 6" vertical, single cylinder air compressor.
1, 5" x 6" vertical, double cylinder air compressor.
1, No. 2 McCully rotary stone crusher.
1, No. 4 Waterloo concrete mixer.
1, portable concrete mixer with gasoline engine.
2, cement block machines complete with plates.
1, 8" horizontal centrifugal sand pump with pipe.
1, 900 gallon, Northey vertical centrifugal pump.
1, 735 gallon, Morris vertical centrifugal pump.
1, 470 gallon, Morris vertical centrifugal pump.
1, 260 gallon, Morris vertical centrifugal pump.

A copy of our supply catalogue or machinery stock list for the asking.

H. W. PETRIE, Ltd.
Toronto Montreal Vancouver

JARDINE UNIVERSAL CLAMP RATCHET DRILL

Indispensable for Machine Repairs, Factories, Machine Shops, Bridge Builders, Track Layers, Structural Metal Workers, have use for it. Send for description.

A. B. JARDINE CO.,
HESPELER, ONT.

Steam Shovels, Locomotives, Cars, etc.

Contractors' and Railway Equipment
Telegraph, Telephone or Write Us
A. C. TORBERT & CO.
547-548 Monadnock Block, CHICAGO.

FOR SALE

Rails—Newand second-hand
Locomotives—Standard and narrow gauge.
Contractor's Equipment.

JOHN J. GARTSHORE
58 Front Street, West, TORONTO

FOR SALE. Great Bargains if you act promptly in D.C.

MOTORS

1—500 volt, 15 Kilowatt. 900 R. 1—250 volt, 11 Kilowatt, 1150 R. 2—250 volt, 8 H.P. 1—250 volt, 10 H.P. 600 R. Built Specially for Hoisting Purposes.

All in First Class Order and no Reasonable Cash Offer refused.

WRITE, WIRE, OR CALL.

ELEVATOR SPECIALTY CO.
Cor. Lombard and Church Sts., TORONTO

Electric & Hand Cranes

NORTHERN CRANES
NORTHERN ENGINEERING WORKS
DETROIT MICHIGAN — U.S.A.

The Newten Cupola

NEW INCORPORATIONS.

Owen Sound, Ont.—William T. Lee & Sons, $40,000; W. T. Lee, C. J. Lee, W. P. Lee.

Hamilton, Ont.—Ben Hur Truck Co., $20,000; F. R. Close, G. J. Henderson, H. E. Ralston.

Winnipeg.—Greater Winnipeg Improvement Company, $60,000; A. Phillips, H. A. Dangerfield, J. Doolittle.

Woodstock, Ont.—Watt Hose & Pipe Coupling Manufacturing Co., $100,000; W. J. Watt, G. E. Phillips, J. A. MacDonald.

Toronto. — Superior Manufacturing Company, $40,000; W. E. Irons, C. Pettet. Vitæ-Ore Company, $2,500; J. R. Noel, J. A. Wright, Miss L. Gilray. Walsh, Neill & Company, $50,000; W. J. Neill, J. J. Walsh, J. L. Coffee. Filters, Limited, $40,000; W. H. Warrington, N. B. Darrell, J. R. L. Starr. Roneo Company, $25,000; G. M. Clark, G. Russell, J. C. MacDonald. G. Hawley Walker, $40,000; G. H. Walker, A. G. Ross, M. L. Gordon.

Montreal.—Merchants Coal Company, $18,000; T. J. Coonan, A. G. Munich, T. I. Lynch. J. C. McLaren Belting Company, $75,000; G. W. MacDougall, L. Macfarlane, C. A. Pope. Rhine Shipping Co., $32,000; G. I. Dewar, Ottawa; W. A. Taft, Arlington; W. H. Chandler, Newton, Mas.. Brophy, Parsons & Rodden, $500,000; T. Brophy, A. Parsons, F. A. Rodden. R. C. Wilkins Company, $95,000; F. D. Monk, C. C. Ballantyne,

(Continued on Page 46).

$3.95; ¼-inch, $3.75; 9-16-inch, $3.70; ⅝-inch, $3.55; ¾-inch, $3.45; ⅞-inch, $3.40; 1-inch, $3.40.

Bar Iron.— $1.95 to $2, base, from stock to wholesale dealer.

Iron Pipe.—Black, ¼-inch, $2.03; ⅜-inch, $2.25; ½-inch, $2.63; ¾-inch $3.56; 1-inch, $5.11; 1¼-inch, $6.97; 1½-inch, $8.37; 2-inch, $11.16; 2½-inch. $17.82; 3-inch, $23.40; 3½-inch, $29.45; 4-inch, $33.48; 4½-inch, $38, 5-inch, $43.50; 6-inch, $56. Galvanized, ¼-inch, $2.86; ⅜-inch, $3.08; ½-inch, $3.48; ¾-inch, $4.71; 1-inch, $6.76; 1¼-inch, $9.22; 1½-inch, $11.07; 2-inch, $14.76. Makers are holding prices stiff.

Lead.—Quiet and unchanged at 3.90 to $4.00 here; in England and the States there is a little excitement, but no great movement.

Lime.—In adequate supply and slow movement. Price for large lots at kilns outside city 22c. per 100 lbs. f.o.b., cars; Toronto retail price 35c. per 100 lbs. f.o.b. car

Lumber.—We quote dressing pine $32 to $35 per thousand; common stock boards higher at $26 to $30.00; cull stocks, $20; sidings, $17.50. Norway pine is neglected in favor of Southern, which is much stronger in fibre and the price well maintained. Hemlock continues to sell pretty freely, and in car lots brings $16.50 to $17.00. Spruce flooring is quoted at $22.00 in car lots. The season being practically over for shingles, there is but little movement in them, and prices are weak though unchanged at $3.20 for British Columbia. White pine lath are scarcer, No. 1 especially, we quote $4 for No. 1 and $3.50 for No. 2 firm. More spruce and hemlock have moved than pine. Prices are maintained all over the list.

Nails.—Wire, $2.55 base; cut, $2.70; spikes, $3. There is a fair supply and no especial activity.

Pitch.— Very quiet; price, 70c. per 100 lbs.

Pig Iron.—Business continues quiet; prices are fairly well maintained. Clarence quotes at $20.50 for No. 3; Cleveland, $20.50 to $21.00; in Canadian pig, Hamilton quotes $19.50 to $20.

Plaster of Paris.—Calcined, wholesale, $2; retail, $2.15. Trade quiet.

Putty.—In bladders, strictly pure, per 100 lbs., $2.25; in barrel lots, $2.05.

Rope.—Sisal, 9¼c. per lb.; pure Manila, 12½c., Base

Sewer Pipe.—

	4-in.	6-in.	9-in.	10-in.	12-in.	24-in.
Straight pipe per foot	$0.20	$0.30	$0.60	$0.75	$1.00	$3.25
Single junction, 1 or 2 feet long.	.90	1.35	2.70	3.40	4.50	14.63
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	.....

In steady demand; price 70 per cent. off list at factory for car-load lots; 60 per cent. off list retail.

Steel Beams and Channels.—Quiet. We quote:—$2.50 to $2.75, according to size and quantity; if cut, $2.75 to $3; angles, 1¼ by 3-16 and larger, $2.50; tees, $2.80 to $3 per 100 pounds. Extra for smaller sizes of angles and tees.

Steel Rails.—80-lb., $35 to $38 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.—Market steady, with fairly good demand; 10-gauge, $2.50; 12-gauge, $2.55; American Bessemer, 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.

Tool Steel.—Jowett's special pink label, 10½c. Cyclops, 16c.

Tin.—Markets abroad very irregular during week, and have not steadied yet. Toronto price, 30 to 31c.

Wheelbarrows.—Navvy, steel wheel, Jewel pattern, knocked down, $21.35 per dozen; set up, $22.35. Pan Canadian, navvy, steel tray, steel wheel, per dozen, $3.30 each; Pan American, steel tray, steel wheel, $4.25 each.

Zinc Spelter.—Business fairly active, market strong at $5.25 to $5.50, and more enquiry.

Montreal, February 4th, 1909.

Number two foundry iron is selling at $15.90 to $16, delivered at Pittsburg, as against $16.40, which latter price was well maintained from November till a few days ago. At the same time, the price of sheets, billets and rivets has declined; but hardly any profit now remains over the cost of production. Evidences accumulate right along that before long there will be a readjustment. It is said that price cutting has been going on right along in an unofficial way, and there appears to be a feeling that it would be a wiser policy to pursue to have these reduced prices recognized as the true selling price, or market condition. Demand for pig is very light, indeed, but makers are holding firm at the prices recently established. It is said, however, that middle men who purchased heavily at the lower prices prevailing two or three months ago, are disposing of considerable tonnage at figures which are under those being asked by furnace men.

Middlesboro advices are to the effect that business has not picked up since the holidays in a satisfactory manner, but is now beginning to show activity. Stocks of Cleveland pig-iron are increasing more slowly than previously, and a decrease has even been reported for the first time for over a month. Some works have closed down, thus strengthening the market. It would seem that the tendency of prices is upwards, again, and the opinion is expressed that the low figure for January will mark the low figure for the year. Exports of pig-iron are light and it is long since so few vessels have been loading. Up to January 20th, shipments were only 42,795 tons, which was lower than in December or in January, 1908, or 1907, up to the same date.

The local market is fairly active, with a good enquiry for spring delivery, a number of larger consumers apparently having the purchase of supplies for the next two or three months under serious consideration. Some good sized lots have been closed for already, and others are under negotiation. The smaller consumers are apparently almost entirely out of metal, as they are constantly seeking to purchase carload lots or less to keep their plants in operation. Import prices are, of course, now based on figures prevailing in England and Scotland, and it is understood that Canadian producers are holding prices at a point which is close to this competition. This policy is a great improvement on that which is understood to have prevailed a year ago, when it is said they were accepting from $1 to $1.50 per ton less than import prices.

During the past week, there have been little or no changes in the local market for iron and steel, and partly finished material, as shown in the following list:—

Antimony.—The market is steady at 9 to 9¼.

Bar Iron and Steel.—Prices are steady all round, and trade is dull. Bar iron, $1.90 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $2.00; sleigh shoe steel, $1.90 for 1 x ¼-base; tire steel, $1.95 for 1 x ¼-base; toe calk steel, $2.40; machine steel, iron finish, $2.10; smooth finish, $2.75.

Boiler Tubes.—The market is steady, quotations being as follows:—2-inch tubes, 8½c.; 2½-inch, 10c.; 3-inch, 11½c.; 3½-inch, 14¾c.; 4-inch, 19c.

Building Paper.—Tar paper, 7, 10, or 16 ounce, $1.60 per 100 pounds; felt paper, $2.40 per 100 pounds; tar sheathing, No. 1, 55c. per roll of 400 square feet; No. 2, 35c.; dry sheathing, No. 1, 45c. per roll of 400 square feet, No. 2, 28c. (See Roofing; also Tar and Pitch).

Cement.—Quotations are for car lots, f.o.b., Montreal. Canadian cement is $1.55 to $1.65 per 350-lb. bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½c. extra, or 10c. per bbl. weight. English cement is $1.65 to $1.85 per 350-lb. bbl. in 4 jute sacks (for which add 8c. each) and $2.20 to $2.40 in wood. Begian cement is $1.60 to $1.65 in bags—bags extra—and $2.10 in wood.

Chain.—The market is steady as follows:—¼-inch, $5.30; 5-16-inch, $4.05; ⅜-inch, $3.65; 7-16-inch, $3.45; ½-inch, $3.20; 9-16-inch, $3.15; ⅝-inch, $3.05; ¾-inch, $3; ⅞-inch, $2.95; 1 inch, $2.95.

Copper.—The market is steady at 15 to 15¼c. per lb. Demand continues limited.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 18c. 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, $3.50; 6-ft. wires, $4; 8-ft. wires, $4.50; 10-ft. wires, $5. Double strength fuses, 1$ extra, per 100 fuses. Fuses, time, double-tape, $6 per 1,000 feet.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, $4.40; Comet, $4.25; Gorbal's Best, $4.25; Apollo, 10¼ oz., $4.35. Add 25c. to above figures for less than case lots; 26-gauge is 25c. less than 28-gauge. American 28-gauge and English 26 are equivalents, as are American 10¾ oz., and English 28-gauge.

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

Iron.—Prices are rather higher, and the outlook is steady. The following prices are ex-store: Canadian pig, $18.50 to $19.50 per ton; No. 1 Summerlee, $21 to $22; No. 2 selected Summerlee, $20.50 to $21.50; Carron soft, $20.25 to $20.75; No. 3 Clarence, $19 to $20 per ton.

Laths.—See Lumber, etc.

Lead.—Trail lead is unchanged and steady, at $3.70 to $3.80 per 100 pounds, ex-store.

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 rate of $1.50. At the moment, the market is exceptionally irregular and prices are uncertain. Red pine, mill culls out, $18 to $22 per 1,000 feet; white pine, mill culls, $22 to $25. Spruce, 1-in. by 4-in. and up, $16 to $18 per 1,000 ft.; mill culls, $14 to $16. Hemlock, log run, culls out, $14 to $16. Railway Ties: Standard Railway ties, hemlock or cedar, 35 to 45c. each, on a 5c. rate to Montreal. Telegraph Poles: Seven-inch top, cedar poles, 25-ft. poles, $1.35 to $1.50 each; 30-ft., $1.75 to $2; 35-ft., $2.75 to $3.25 each, at manufacturers' points, with 5c. freight rate to Montreal. Laths: Quotations, per 1,000 laths, at points carrying $1.50 freight rate to Montreal, $2 to $3. Shingles: Cedar shingles, same conditions as laths, X, $1.50; XX, $2.50; XXX, $3.

Nails.—Demand for nails is moderate, but prices are steady at $2.30 per keg for cut, and $2.25 for wire, base prices

Pipe—Cast Iron The market continues steady at $33 for 8-inch pipe and larger; $34 for 6-inch pipe; $34 for 5-inch, and $34 for 4-inch at the foundry. Pipe, specials, $3.10 per 100 pounds. Gas pipe is quoted at about $1 more than the above.

Pipe.—Wrought and Galvanized.—The market is steady, moderate-sized lots being: 1-4-inch, $5.50 with 63 per cent. off for black, and 48 per cent. off for galvanized; ⅜-inch, $5.50, with 59 per cent. off for black and 44 per cent. off for galvanized. The discount on the following is 69 per cent. off for black and 59 per cent. off for galvanized; ½-inch, $8.50; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27; 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.50; 3½-inch, $95; 4-inch, $108

Rails.—Quotations on steel rails are necessarily only approximate and depend upon specification, quantity and delivery required. A range of $31.50 to $32.50 is given for 60-lb., 70-lb., 80-lb., 85-lb., 90-lb., and 100-lb. rails, per gross ton of 2,240 lbs., f.o.b. mill. Re-laying rails are quoted at $27 to $29 per ton, according to condition of rail and location.

Railway Ties.—See lumber, etc.

Roofing.—Ready roofing, two-ply, 64c. per roll; three-ply, 86c. per roll of 100 square feet. (See Building Paper; also Tar and Pitch.)

Rope.—Prices are steady, at 9 1-2c. per lb. for sisal, and 12c. for Manila. Wire Rope, crucible steel, six-strands, nineteen wires: ¼-in., $2.75; 5-16, 3.75; ⅜, $4.75; ½, $6; ⅝$7.25; ¾, $8.50; ⅞, $10; 1 in., $12 per 100 feet.

Shingles.—See lumber, etc.

Spikes.—Railway spikes are in dull demand and prices are steady at $2.40 per 100 pounds, base of 5½ x 9-16. Ship spikes are also dull and steady at $3 per 100 pounds, base of ½ x 10-inch and ⅝ x 12-inch.

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

Steel Plates.—The market is steady. Quotations are: $2.15 for 3-16, $2.25 for ¼, and $2.15 for ¼ and thicker; 12-gauge being $2.30; 14-gauge, $2.05; and 16-gauge, $2.10.

Tar and Pitch.—Coal tar, $4 per barrel of 40 gallons, weighing about 500 pounds, roofing tar, $3.15 per barrel; roofing pitch, No. 1, $1 per 100 pounds; and No. 2, 50c. per 100 pounds; pine tar, $8.50 per barrel of 40 gallons, and $4.75 per half-barrel; pine pitch, $4 per barrel of 180 to 200 pound. (See building paper; also roofing.)

Telegraph Poles.—See lumber, etc.

* * * *

Winnipeg, February 1st, 1909.

Market conditions in Winnipeg are holding steady, and the demand although very light is fairly good for this time of the year, and the prospects seem bright for the coming building season.

There is an advance in the price of lumber reported at Vancouver, but up to date, has not affected the prices of lumber on the local market, although on inquiry from several dealers they state that the price of lumber will likely advance in the near future.

All contracts have now been signed for the Municipal Power work, and the successful contractors are now very busy getting in shape to start the work. It will take at least three months for the contractors to get in readiness to go ahead with work on the power plant.

The local labor market is very much overcrowded and due to the fact that the building season will not open for some time yet, a great many laboring men are having to depend largely on charity until such time as the building operations commence.

The following quotations are correct for this week:—

Anvils.—Per pound, 10 to 12½c.; Buckworth anvils, 80 lbs., and up, 10¼c.; anvil and vise combined, each, $5.50.

Bar Iron.—$2.50 to $2.60.

Beams and Channels.—$3 to $3.25 per 100 up to 15-inch.

Building Paper.—4½ to 7c. per pound. No. 1 tarred, 84c. per roll; plain, 60c.; No. 2 tarred, 62½c.; plain, 56c

Bricks.—$11, $12, $13 per 1,000, three grades.

Cement.—$2.65 to $2.75 per barrel.

Chain.—Coil, proof, ¼-inch, $7; 5-16-inch, $5.50; ⅜-inch, $4.90; 7-16-inch, $4.75; ½-inch, $4.40; ⅝-inch, $4.20; ¾-inch, $4.05; logging chain, 5-16-inch, $6.50; ⅜-inch, $6; ¼-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.—Plaster's, 80 to 90 cents 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.

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, 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.

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

Pipe.—Iron, black, per 100 feet, ¼-inch, $2.50; ⅜-inch, $2.80; ½-inch, $3.40; ¾-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, 6½c. per lb.

Picks.—Clay, $5 dozen; pick mattocks, $6 per dozen; clevishes, 7c. 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 67½c. per roll.

Lumber.—No. 1 pine, spruce, tamarac, British Columbia fir and cedar—2 x 4, 2 x 6, 2 x 8, 8 to 16 feet, $27.25, 2 x 20 up to 32 feet, $38.

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

Tool Steel.—8½ to 15c. per pound.

Timber.—Rough, 8 x 2 to 14 x 16 up to 32 feet, $34; 6 x 20, 8 x 20 up to 32 feet, $38; dressed, $37.50 to $48.25.

Boards.—Common pine, 8-inch to 12-inch wide, $38 to $45; siding, No. 2 white pine, 6-inch, $55; cull red or white pine or spruce, 6-inch, $24; No. 1 clear cedar, 6-inch, 8 to 16 ft., $60; Nos. 1 and 2 British Columbia spruce, 6-inch, $55; No. 3, $45.

Flooring.—No. 2 red pine, 4-inch, $43; No. 3 red, 4-inch, $38; No. 4 red and white pine or spruce, 4-inch, $28; ceiling, No. 2 white pine, 4, 5, and 6-inch, $55; No. 3 red pine, $38.

Lath.—No. 1 red and white pine mixed, $5.50; No. 2, $4.75.

Shingles.—No 1 British Columbia cedar, $4.25; No. 2, $3.75; band sawn, $6.

Rope.—Cotton, ¼ to ½-in. and larger, 23¾c. lb.; deep sea, 18c.; lath yarn, 9¼c.; pure Manila, per lb., 13¾c.; British Manila, 11¾c.; sisal, 10¼c.

(Continued from Page 44).

P. F. McCaffrey. Dawson & Company, $75,000; J. A. Dawson, G. G. Buch, J. N. Brissette. Desmarais & Robitaille, $190,000; E. Desmarais, L. A. Robitaille, A. Lanctot. Lake Lamothe Company, $20,000; A. Lamothe, St. Denis; E. A. Lamothe, L. Guertin, Montreal. Club Liberal, St. Louis, $10,000; A. P. Pigeon, J. Monette, E. Bolt.

ACCIDENTS ON CANADIAN RAILWAYS.

Sixty-four passengers were killed on Canadian railways and 326 injured during the year, as compared with 42 killed and 210 injured in 1907. During the same period 246 employees were killed and 866 injured, as against 212 killed and 317 injured in 1907. Including people killed on the tracks and in other ways the total number of killed was 529, and injured 1,309, as against 460 killed and 603 injured during the present fiscal year.

On the C.P.R. 283 people were killed and 314 injured, as against 218 killed and 140 injured in 1907.

On the Grand Trunk 165 were killed and 721 injured, as against 160 killed and 303 injured in 1907.

On the Canadian Northern the killed numbered 19 and the injured 123, as compared with 30 killed and 92 injured in 1907.

On the Michigan Central 25 were killed and 72 injured, as against 29 killed and 12 injured in 1907.

BUYERS' REFERENCE

Numbers indicate pages on which may be found advertisements of desired materials.