

CANADIAN CONTRACT RECORD

*A Weekly Journal of Engineering, Public Works,
Tenders, Advance Information and Municipal Progress*

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We are installing Tanks and Towers all over Canada for

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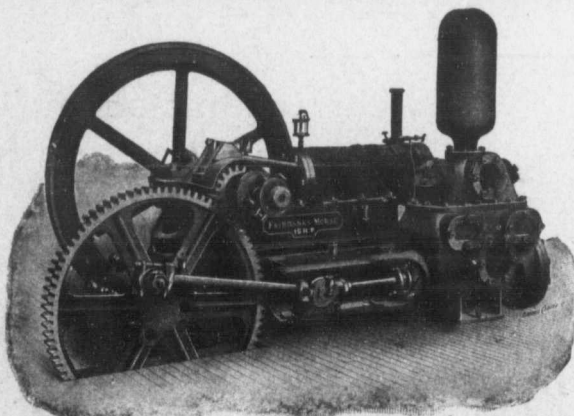
A Canadian Company organized to promote and develop for itself or other persons all commercial and industrial enterprises; to undertake the construction of all kinds of public, municipal and private works, and especially railways, tramways, water works, sewers, hydraulic and electrical installations.

The Company is supported and backed in Europe by nine of the strongest Banks, enabling it to carry through the largest undertakings, and to financially take an interest in Canadian enterprises.

The Company has a staff of competent and experienced engineers, and invites correspondence from municipal and private corporations, and from business men who require technical or financial assistance to plan, execute or construct any private, municipal or public work.

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Gasoline Combined Pumpers

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**Simple, Compact
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Write for Descriptive Matter

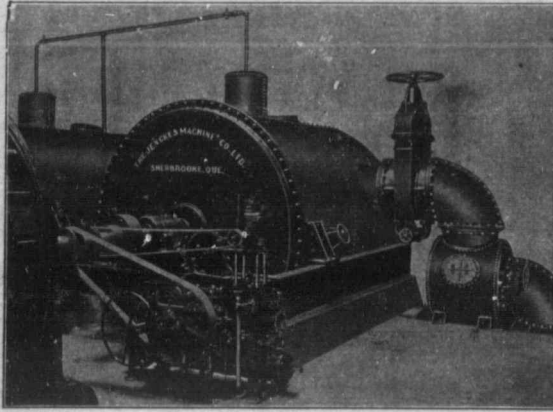
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TENDERS AND FOR SALE DEPARTMENT

TENDERS

Tenders will be received until 5 o'clock on Tuesday, the 31st inst., for all trades (except heating) required in the erection of the proposed new ST. HELEN'S CHURCH, at Dundas street and St. Clarens avenue. Plans and specifications may be seen on and after Wednesday, the 28th instant, at the office of the undersigned. Each tender must be accompanied by a marked cheque equal to 5 per cent. of its amount, payable to the order of the Chairman of the Building Committee of St. Helen's Church. The lowest or any tender not necessarily accepted.

ARTHUR W. HOLMES, Architect,
10 Bloor street east, Toronto.

Corporation of the City of Revelstoke Notice to Contractors

The Municipal Council of the City of Revelstoke is prepared to receive tenders for constructing a Sewage System for the city according to plans and specifications which may be seen at the City Hall, Revelstoke, B.C. on and after the 28th inst.

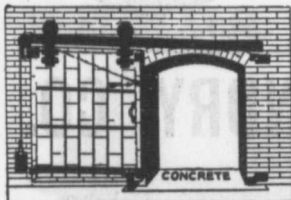
Tenders must be sealed, endorsed on the outside, "Tender for Sewage," and reach the undersigned not later than NOON of FRIDAY, DECEMBER 27, 1907.

Tenders must be accompanied by an accepted cheque, payable to the Revelstoke City Treasurer, equal to five per cent. (5%) of the amount of the tender, which cheque will be forfeited if the party tendering declines to enter into a contract when called upon to do so, or fails to complete the work contracted for.

The lowest or any tender not necessarily accepted.
H. A. BROWN, Mayor.
H. FLOYD, City Clerk.
Revelstoke, B.C., Nov. 25, 1907.

SEPARATE TENDERS

will be received up to 3 P.M. JANUARY 14TH, 1908, by Thos. McCosh, Secretary of Board of Education, Paris, Ont., for all trades required in the erection of a PUBLIC SCHOOL at Paris. Plans and specifications may be seen at the office of Simpson & Young, Architects, 17 Toronto Street, Toronto, also at Thos. McCosh's, Secretary of Board of Education, Paris. Accepted tender will be required to make a satisfactory deposit. No tender necessarily accepted.



A Sagging Fireproof Door

is adjusted by simply turning a screw where our "Adjustable Fire Door Hangers" are used. This saves you time and your customer money. We make, cover and supply the Doors at an interesting figure. Write for Booklet.

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Years from 1880 to 1907, substantially bound in fifteen books. The property of the Estate of the late W. F. Van Buskirk, C.E.

WM. MAHLON DAVIS,
Town Engineer, Berlin, Ont.

City of Sherbrooke Province of Quebec

Tenders for Pipe

Sealed tenders addressed to the undersigned, and marked "Tenders for cast iron water pipe and fittings," will be received up to TUESDAY, DECEMBER 31ST, 1907, for about 316 feet 24 inch cast iron water pipe, 15,100 feet of 18 inch and 7,000 feet 16 inch, also fittings for above sizes.

The lowest or any tender not necessarily accepted.
Particulars may be obtained from
THOMAS TREMBLAY,
Supt. Waterworks,



DEPARTMENT OF RAILWAYS AND CANALS, CANADA

TRENT CANAL

Ontario-Rice Lake Division SECTION No. 2.

Notice to Contractors

Sealed tenders addressed to the undersigned and endorsed "Tender for Trent Canal," will be received until 16 o'clock on SATURDAY, FEBRUARY 1ST, 1908, for the works connected with the construction of Section No. 2, Ontario-Rice Lake Division of the Canal.

Plans and specifications of the work can be seen on and after the 4th December, 1907, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Trent Canal, Peterboro, at which places forms of tender may be obtained.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 28th November, 1907.
Newspapers inserting this advertisement without authority from the Department will not be paid for it.

THE PRIESTMAN EXCAVATOR AND DREDGER

is used throughout the world. Will do more work with less labor, at a less first cost than any Excavator at present in use in Canada. For particulars write

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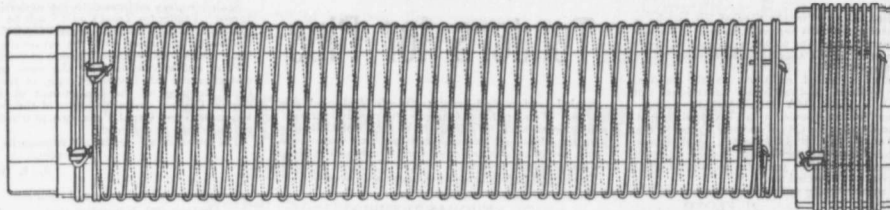
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No frost breaks, no corrosion. No electrolysis. It is easily and cheaply laid.
Its carrying capacity is never decreased by rust.



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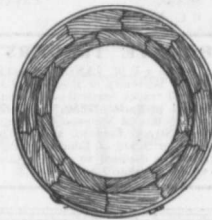
Showing special method of winding with two independent parallel wires.
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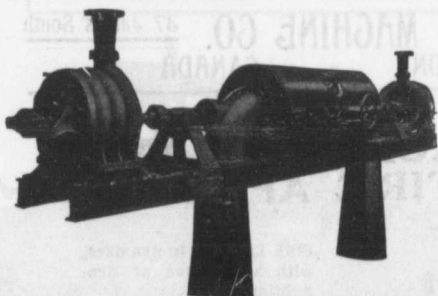


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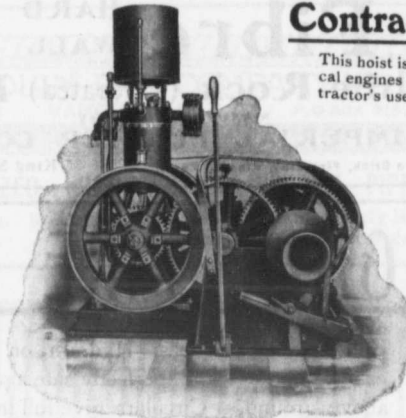
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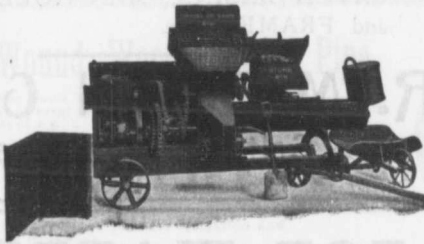
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This hoist is designed for use with our vertical engines and is intended for general contractor's use where a double platform elevator is employed, one platform descending as the other ascends. It is equipped with winch head on one side which can be used for elevating beams or other material that cannot be taken up on regular elevator. The drum sheave over which the elevator cable runs is placed on the other side of hoist. This sheave and the winch head are interchangeable so that they can be placed on either side desired. Can be operated by steam, gasoline or electric power.

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THIRTY-SEVEN plow-shaped blades in an open mixing trough mix the material thoroughly, first dry, then wet.

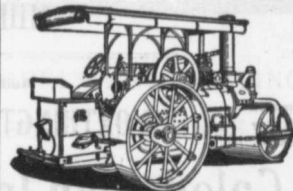
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CEMENT

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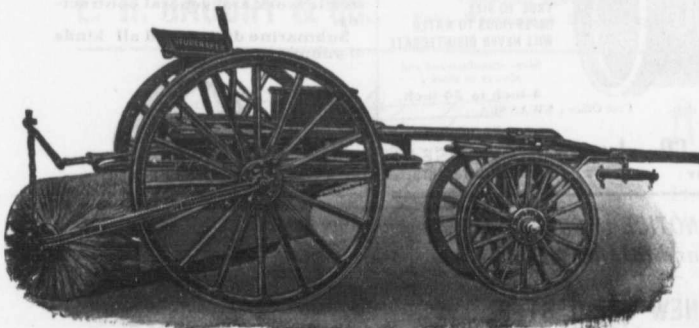
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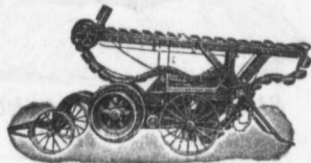
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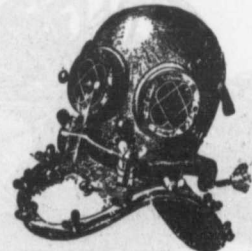
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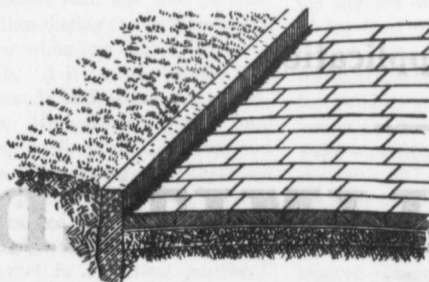
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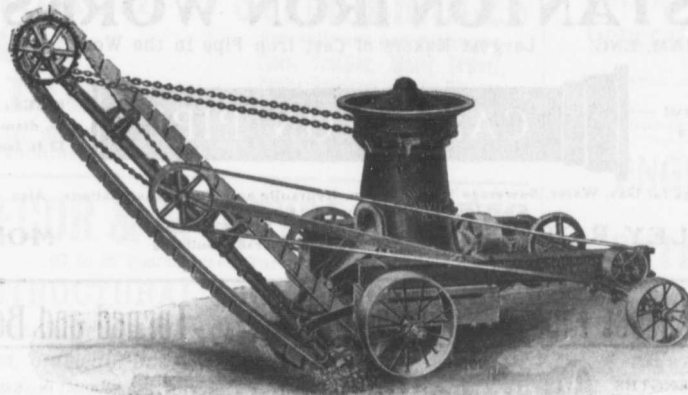
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WINNIPEG Telephone 224 330 Smith Street
ROLAND F. HILL, Representative.

VANCOUVER Telephone 2248 615 Hastings Street
GEORGE A. GALL, Representative.

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THE UNEMPLOYED.

Perhaps never before in Canada's history has the problem of the unemployed loomed so large as at the present. The streets of our larger cities are thronged with unskilled laborers, whose ranks appear to swell daily with the advent of European immigrants and stragglers from across the American border. For the best of them there is little work, and for the less desirable—who are in the majority—employers have no use at the best of times. It cannot be denied that Canada has during the past few months been unconsciously absorbing countless immigrants, whose future is as ill-defined as their presence is undesirable.

The London Board of Trade returns show that the building trades in the south of England have a greater number of unemployed at the present moment than has been the case at any time during the past ten years, while according to a Berlin, Germany, despatch, "it is feared that the tens of thousands of Russian Poles, Lithuanians, Hungarians, Greeks and Italians, landing at Hamburg and Bremen, after having spent their last coins on passage money back, may become stranded in Germany, and put the already overcrowded domestic labor market in a critical position." The Imperial Government is being urged to consider "whether Germany should not immediately resort to the vigorous prohibitive measures enforce-

ed by the American immigration authorities and arbitrarily put up bars against the torrent of homeless undesirables."

All over the world the situation is the same, and somewhat the same relief measures are everywhere proposed. The unemployed belong to a great extent to the building classes. The building trades are dependent, of course, upon the other trades of the country. Aside from the financial distress the lack of employment results to some extent from the old prejudice against the execution of building work in the winter months, but gradually this prejudice is being overcome, since it is realized that some structural operations can be carried on as economically at this season of the year as at any other. However, it happens this year, as it has always happened in the past, that no attempt has been made to reserve for the winter months certain municipal undertakings which might be held over from the summer when other individual and more pressing work called for most of the available labor. This principle of distributing throughout the year works requiring unskilled help has been already recognized and put into practice in France. The city of Paris, it is said, has this year no such labor problems as have other countries. The conditions perhaps do not apply so immediately to Canada, but the principle is a good one and worthy of due consideration.

The old fortifications of Paris have been rendered useless by alterations in fighting methods and modern ordinance. They are of vast extent and the city has so grown that the value of the land within the fortifications is high. By the demolition of the fortifications land can be thrown open for building purposes. The work is remunerative and the authorities make a profit out of the transaction, the value of land being so high that the great expense of removing the fortifications and constructing new streets is completely covered. Under kindred circumstances a Canadian municipality would proceed with all haste to get the return. Contractors would be called in and the work pressed forward continuously all the year

round until it was finished. But not so with the Paris authorities. They realize that whereas by such a method they could give regular employment for a time, and perhaps necessitate overtime working, in a comparatively short time they would have a number of unemployed to keep during the winter, for whom extra provision would have to be made. Therefore they have not hastened unduly to remove this source of remunerative work, but reserve it for times when labor is in need of employment. The process, therefore, of removing the fortifications is slow, but the community is spared the expense of keeping paupers during periods such as we have in Canada to-day.

Moreover, Paris has adopted the piecemeal principle. Each laborer is paid by the quantity of soil he removes. This is a commendable principle where practicable. Unskilled labor in Canada to-day is not of the first-class and is not dependable.

In the execution of public improvements the plan of the Paris authorities might well be emulated by Toronto. There are many small works and some large ones, whose execution, if properly dealt with by a practical council, could be distributed over the slack season and obviate the necessity of the city providing for a pauper population through the winter months.

CANADA'S FINANCIAL STATEMENT

The financial statement of the Dominion giving the total revenue and expenditure for the present fiscal year, according to returns furnished the Finance Department up to November 30, shows a total revenue for the first eight months, April to November, inclusive, of \$66,662,427, and a total expenditure of \$58,198,943. Total revenue increased by \$9,148,875, the increase for last month being \$764,992. Of the aggregate increase in revenue for the eight months \$7,216,810 was in customs receipts, \$749,881 from excise, \$437,310 from post-office, and \$582,047 from public works, including railways.

The total net debt of the Dominion on November 30th stood at \$254,096,874, an increase of \$2,590,141 during the month.

THE COMMERCIAL SITUATION

SHOULD AMEND BANKING ACT.

While the present session of Parliament is sitting, steps should be taken to amend the Banking Act, to the extent that it would forbid the investment of Canadian deposits in foreign countries. Legislation should be put in force that would prevent the loaning of our deposits on outside securities. Much has been said during the past month or two regarding the many millions of dollars of Canadian money in New York and elsewhere, while it was and is badly needed in our own country.

There is no use referring halfheartedly to a matter and then letting it drop, never to be touched again. Some do such a thing merely to "square" themselves with the public, and to have it on record that they took this or that stand on some question or other. It is up to the people of Canada to demand their rights, and they should give the banks to understand where their (the people's) deposits should be invested. The people's representatives are at the present time legislating in Ottawa, and petitions of business men and others interested should be forwarded with a view to bringing about the desired change in the Banking Act.

The prosperity this country has enjoyed does not warrant tight money at this time for legitimate needs with sixty or seventy millions of Canadian money in New York at the pleasure of the stock market gamblers.

BANKS BLAMING EXPANSION.

The banks have been facing the criticisms of their actions in refusing credit by claiming that the business of the country has been expanding too rapidly. They give this as the cause of the present monetary situation. They practically blame the business men. The latter can feel quite absolved from this blame, for it is well known that manufacturers and wholesalers are behind with their orders. The manufacturers have not been straining every sinew to load the

country stores up with merchandise that was not required. The great cry in this country has been that, owing to the rush at the factories, a merchant would have to order very far in advance in order to secure the goods in anything like reasonable time. The population of central and Western Canada has been growing so rapidly that the goods were really required. We have not heard any complaints of country stores being over-stocked.

The banks alone are responsible for the situation in Canada. They have been loaning freely on almost any speculation. Stock brokers in Toronto and Montreal will advance millions on Yankee stocks, to the disadvantage of Canadian enterprise. Millions of dollars of Canadian money has gone to build up foreign enterprises. Another thing, our banks have been locking up millions of money too freely in their buildings for branch and head offices. The Bank of England could hardly afford the investment of some of our banks in such buildings.

TRADE CONDITIONS.

In his address, as president, before the Institute of Bankers in London on November 27, Sir Felix Schuster gave a warning of signs of a reaction in trade. Present indications, he said, point rather to restriction than expansion. Not only in Great Britain, but throughout the world the recent enormous development of trade, especially in railroad construction and electrical undertakings, had caused expansion at such a rapid rate that the capital available had not sufficed to meet so many demands. This, he declared, applies particularly to America and Germany, but its effect must gradually make itself felt in all markets.

Like every other crisis, he pointed out, the American crisis has arisen through over-confidence brought about by an abnormally prosperous state of affairs, but that the United States would ultimately out of its own resources, overcome its present

troubles, did not, to his mind, admit of the slightest doubt.

WESTERN WHEAT YIELD.

The total yield of all grain in the Canadian Northwest is estimated at 163,936,500 bushels, according to a circular issued on November 26 by F. O. Fowler, secretary of the Northwest Grain Dealers' Association, showing the position of the crop on November 15.

The yield of wheat per acre is put at 12.9 bushels, and on a previously estimated acreage of 5,013,544, makes the total wheat yield 64,675,000 bushels.

Mr. Fowler makes the oat yield per acre 34.3 bushels, and with an acreage of 2,373,030, the production of this grain aggregates 81,395,000 bushels.

WESTERN WHEAT MOVING SLOWLY.

While the wheat shipments of the Canadian Pacific have of late shown a steady improvement in bulk they are still a long way behind the figures for last year. While this is the case for the whole month of November, the shipments for the latter part of the month and the first few days of December have shown a decided increase over the figures for last year, showing that there is a determined effort to get the crop out as far as possible before the close of navigation.

C. P. R. wheat receipts at Fort William for November amounted to 3,607,400 bushels as compared with 3,865,926 during November of last year. Shipments from Fort William, however, were only 2,881,355 bushels for the month, as compared with 4,824,719 last year, a decided falling off. During the first four days of December, however, 504,332 bushels of wheat were received at Fort William and 1,068,825 shipped as compared with 419,876 received and 715,463 shipped during the same days last December.

Dominion Government Estimates for 1908-9

The Dominion Government estimates for the year ending March 31, 1909, calling for a total expenditure of \$119,237,091, were recently submitted to Parliament. Included in this amount is a sum of \$30,000,000 for the National Transcontinental Railway, but apart from this the bulk of the money is for the construction of public buildings, canals, docks and grain elevators. Following are details:—

RAILWAYS—CHARGEABLE TO CAPITAL.

Intercolonial Railway.—To increase accommodation at Halifax, \$500,000; improvement at Windsor, \$2,500; extension to Sydney Mines, \$19,500; improvements at North Sydney, \$4,000; increased accommodation at Sydney, \$14,000; improvements at Mulgrave, \$46,800; water service at Pirate Harbor, \$5,000; increased accommodation at Antigonish, \$4,500; increased accommodation at New Glasgow, \$10,000; increased accommodation at Stellarton, \$6,500; to increase accommodation at Pictou, \$8,600; to increase accommodation at Truro, \$105,000; increased accommodation at Springhill Junction, \$2,900; improvements at Amherst, \$47,000; improvements at Sackville, \$27,000; towards double tracking parts of line, \$200,000; locomotive and car shops with equipment, \$570,000; new machinery for locomotive and car shops, \$155,000; rolling stock, \$1,550,000; air brakes to freight cars, \$21,000; to exchange draw bars, freight cars, \$31,000; side ladders on box cars, \$10,000; air brake equipment, etc., \$10,500; to increase accommodation at St. John, \$120,000; improvements at Loggieville, \$14,950; to put railway between Indiantown and Blackville into condition for operation, \$80,000; improvements at Newcastle, \$38,000; extension of wharf at Dalhousie, \$3,000; improvements at Campbellton, \$25,000; to increase accommodation at Ste. Flavie, \$20,500; engine house, machine shop, etc., at Riviere du Loup, \$115,500; to increase accommodation at Levis, \$3,000; engine house, etc., Chaudiere Junction, \$55,400; improvements at Drummondville, \$6,000; improve-

ments at Ste. Rosalie, \$85,900; increased accommodation and facilities along line, \$169,000; to strengthen bridges, \$190,000; to increase water supply, \$26,200; new turntables, \$16,500; Pintsch gas apparatus, \$2,500; Siding Princess Pier, Levis, \$4,000;

Prince Edward Island Railway.—Increased accommodation at Charlottetown, \$260,000; extension of wharf at Souris, \$18,500; rolling stock, \$71,500; new machinery, \$20,000; increased accommodation and facilities along the line, \$6,550; spur line and ballast pit, \$30,000; steel rails, \$10,000.

National Transcontinental Railway.—Surveys and construction, \$30,000,000.

CANALS—CHARGEABLE TO CAPITAL.

Quebec Canals.—Steam road roller and stone crusher, \$7,000.

Lachine Canal.—Rebuilding slope walls, \$238,750; testing cement, \$2,500; to build wharf and basins, \$300,000.

Soulanges Canal.—Improvements, \$15,000.

Chambly Canal.—St. John's Harbor improvements, \$54,000; building new power house over weir at Bridge Weir 2, \$5,000.

St. Lawrence Canal.—District Office, \$7,000.

Galops Canal.—Upper entrance, final estimate, \$6,600; North Channel and Cut Dam between Les Galops and Adams Island, final estimate, \$40,780.

St. Lawrence River.—Removal of shoals in river, upper entrance Galops Canal, \$20,100.

Trent Canal.—Construction, \$1,000,000.

Welland Canal.—Electric lighting and power plant, \$50,000; to remove centre piers and rebuild bridges at Queenston street and Homer road crossing, \$30,000; to make survey of canal, \$20,000; to widen canal near Welland, \$55,000; Port Colborne, improvements, \$115,000; Port Colborne, elevator, \$172,000.

Sault Ste. Marie.—Construction, \$105,000.

Quebec Canals.—Re-marking boundaries, surveys, etc., \$10,000;

dredging, \$18,500.

Lachine Canal.—Wall north side Basin No. 2, \$98,000; wall side Basin No. 2, \$49,000; workshops, \$15,000.

Beauharnois Canals.—Improvements, \$10,000.

Soulanges Canal.—Improvements, \$3,300.

Chambly Canal.—Renewing telephone line, \$6,000; renewing part of wharf, St. John's, \$5,500; to strengthen banks, Ste. Therese, \$9,000; to macadamize towpath to complete, \$10,000; alterations and additions to lock-master's house, Lock 4, \$1,500; land damages, \$500; to macadamize road west side of canal, \$3,000.

Carillon and Grenville Canals.—To macadamize road, Carillon Canal, \$10,500; Mamny's protection beams for lock gates, \$3,000; renewing Carillon lighthouse, \$900.

Cornwall Canal.—To rebuild river wharf at foot of canal, \$2,500; to build a gate lifter, \$10,000; to complete north bank above lock 21, \$10,000; to provide storage room for spare gates, \$2,000; to repair north bang between locks 18 and 19, \$5,000.

Galops Canal.—To build retaining walls, \$4,000; to build concrete superstructure, upper entrance, \$5,000.

Murray Canal.—To rebuild pier of concrete, \$25,000; to provide houses for bridgemen, \$5,000.

Rideau Canal.—Improvements, \$4,500.

Trent Canal.—Improvements, \$45,000; new lock and dam, Lindsay, \$80,000; new dredge, \$15,000; dam at Buckhorn, \$25,000.

Welland Canal.—To build retaining wall in Rock Cut, \$80,000; to renew entrance piers, Port Maitland, \$100,000; repairs to foundations, lock 2, \$12,000; fire pump for repair shops, \$2,500; stone protection to banks, \$10,000; to deepen ditches and enlarge culvert at Marshville, \$15,000; heavy repairs, \$30,000.

Sault Ste. Marie Canal.—New lock gates, \$20,000.

PUBLIC WORKS—CHARGEABLE TO CAPITAL.

Public Buildings.—Ottawa Astronomical Observatory, additional buildings, etc., \$15,000; Ottawa Royal

Mint, \$25,000; Ottawa Parliament Buildings, additions and alterations, \$150,000; Ottawa Victoria Memorial Museum, \$300,000; Ottawa addition to eastern Departmental Block, \$75,000; Ottawa New Department Buildings, \$250,000.

Harbors and Rivers.—Quebec Harbor, improvements, \$500,000; Port Arthur and Fort William, harbor and river improvements, \$500,000; Red River, improvements at St. Andrew's Rapids, \$300,000.

PUBLIC WORKS—CHARGEABLE TO CAPITAL.

PUBLIC BUILDINGS.

Nova Scotia.—Antigonish, public building, \$7,000; Bridgewater, public building, \$22,000; Glace Bay, public building, \$20,000; Halifax Dominion Building, improvements, repairs, etc., \$15,000; Halifax Immigration Building, renewals and repairs in connection with heating, plumbing, etc., \$1,800; Halifax Immigration Detention Building, \$7,000; Halifax Military Buildings, Wellington Barracks, reconstruction of married men's quarters, \$45,000; Halifax New Public Building (custom house), \$12,000; Halifax Quarantine Station on Lawlor's Island, winter hospital, electric plant, repairs, etc., \$16,000; Inverness, public building, \$10,000; Shelburne, public building, \$10,000; Westville, public building, \$15,000; Yarmouth, public building, \$4,000.

Prince Edward Island.—Georgetown, public building, \$5,000.

New Brunswick.—St. John Dominion Buildings, improvements, repairs, etc., \$4,000; St. John Military Buildings, addition to stores building and wagon and gun shed, \$6,000; St. John Quarantine Station, Partridge Island, to complete water service, etc., \$2,500; St. John Quarantine Station, Partridge Island, site for steam sterilizer, dwelling for boatman, improvements and repairs to existing buildings, etc., \$5,000; Tracadie Lazaretto, laundry and sanitary works, \$6,000.

Quebec.—Chicoutimi Post Office, \$7,500; Cookshire Post Office, \$5,000; Dominion Public buildings, renewals, improvements, repairs, etc., \$20,000; Dundee Custom House, renewals and repairs, \$1,800; Farnham Post Office, alterations, including re-arrangement of fittings, \$5,500; Grosse Isle Quar-

antine Station, improvements and repairs to buildings, \$12,000; Grosse Isle Quarantine Station, disinfecting apparatus, including building, \$3,500; Immigration Buildings generally, \$5,000; Knowlton Public Library, \$4,500; Lachute Public Library, \$10,000; Lake Megantic Public Building, \$2,000; Levis Public Building, \$10,000; Longueuil Public Building, \$500; Magog Public Building, \$13,000; Marieville Public Building, \$7,500; Montreal barracks for permanent corps, \$20,000; Montreal General Post Office, enlargement, additions and alterations, including fittings, furniture, etc., \$70,000; Montreal Military Buildings, new stores building, \$10,000; Montreal new Postal Station "B," site and building, St. Catharine street, \$20,000; Montreal new Postal Station at Point St. Charles, \$25,000; Montreal Eastern Postal Station, \$25,000; Montreal Public Buildings, improvements, alterations, repairs, etc., \$8,000; Nicolet Public Building, \$10,000; Plessisville, public building, \$2,000; Quebec Citadel, drill shed for School of Gunnery, \$10,000; Quebec Citadel, Governor-General's quarters, repairs, furniture, etc., \$2,000; Quebec, Custom House, repairs, furniture, etc., \$1,200; Quebec, Drill Hall, addition to building and levelling ground, \$9,000; Quebec, Examining Warehouse, alterations, fittings, etc., \$1,500; Quebec, Immigration Buildings, additions, renewals, etc., \$7,500; Quebec, Immigrant Hospital for trachoma and kindred diseases, in Savard Park, reconstruction of building destroyed by fire, \$5,000; Quebec, Military Buildings, main store building at Dominion arsenal, \$21,000; Quebec East, Public Building, 30,000; Sherbrooke, Drill Hall, \$20,000; St. Henri Post Office, improvements, \$1,200; St. Hyacinthe Public Building, improvements and repairs, etc., \$2,500; St. Johns Military Buildings, stables for cavalry, \$25,000; St. Johns Public Buildings, \$10,000.

Ontario.—Arnprior Public Building repairs and improvements, \$500; Belleville Armoury, \$75,000; Brantford Public Building, improvements, \$500; Dominion Public Buildings, renewals, improvements, repairs, etc., \$20,000; Glencoe Public Building, \$3,

500; Guelph Armoury, \$20,000; Hamilton Drill Hall, addition, \$100,000; Hamilton Post Office, alterations to building, etc., \$7,000; Kincardine Public Building, \$7,000; Kingston, new gun shed, \$7,000; Kingston Artillery Park, new guard house, including offices, etc., \$8,000; Kingston, new hospital for "A" and "B" batteries, \$10,000; Kingston Royal Military College, new servants' quarters, \$10,000; Kingston Royal Military College, barrack accommodation for stables, \$5,000; Kingston new magazine, \$3,000; Kingston Veterinary Hospital, \$6,000; Leamington Public Building, \$7,000; London Military Buildings, magazine, \$3,000; London Military Buildings, new gymnasium, \$5,000; London Post Office, additions and improvements, \$3,000; Markham Public Buildings, \$4,000; North Bay Public Building, \$20,000; Ontario Public Buildings, fire escapes, \$5,000; Ontario Military Buildings, armoury for one section field telegraphs, \$3,500; Ontario Military Buildings, additional stores building, \$7,000; Ontario Military Buildings, gun and wagon shed, \$7,000; Ottawa Departmental Buildings, renewal of skylights, \$6,000; Ottawa Printing Bureau, electric motor machinery, \$6,000; Owen Sound Public Building, \$50,000; Parkhill Public Building, \$5,000; Peterboro' Armoury, \$20,000; Port Arthur Public Building, addition, \$10,000; Renfrew Public Building, \$10,000; St. Mary's Public Building, \$12,000; Sarnia Public Building, alterations and additions, \$5,000; Simcoe Public Building, \$10,000; Toronto Custom House, alterations and additions, \$5,000; Toronto Dominion Buildings, improvements, renewals, repairs, etc., \$5,000; Toronto Drill Hall, additional accommodation for new corps and armouries, \$50,000; Toronto Meteorological Observatory, \$25,000; Toronto Military Building, magazine, \$3,000; Toronto Military Buildings, barracks for permanent corps to replace property sold to the city, \$50,000; Toronto Post Office, addition and alterations, furniture, fittings, etc., to make good damage by fire, April 29, 1906, \$5,000; Toronto Post Office, annex for customs parcel purposes, \$15,000; Toronto Post Of-

(Continued on Page 24.)

STRUCTURAL FEATURES OF SINGER BUILDING, NEW YORK.

(Concluded from last week's Issue.)

All of the structural steel was fabricated at the Milliken bridge shop, the tower, dome and lantern on account of the narrow horizontal area for working and the consequent necessity of keeping the boom derrick topped up in an almost vertical position. Very great pains were taken here, as in the erection of the framework of the main building, to preserve the verticality of all columns as accurately as possible. This was accomplished by the liberal use of large numbers of wire rope diagonals in the vertical panels between columns and floor beams. As soon as it was erected, each column was carefully plumbed and if found at all out of vertical one, two or three diagonals were immediately attached to its upper end and adjusted by means of turnbuckles which maintained it rigidly in position until its splices and brace connections were riveted. This method was so successful that when the framework was completed to the full height of 612 feet above the curb, the greatest deviation of the vertical columns in the elevator shaft was only 3-8 inch.

There are about 220,000 field rivets, 3-4 inch and 7-8 inch in diameter, which were driven with twelve pneumatic hammers of the Chicago, Independent and Cleveland types. Air was compressed by two Ingersoll-Sergeant machines on the first floor, which delivered through a 2 1-2 inch vertical standpipe run to the top of the building and was provided with 2 1-2 inch horizontal branches having 3-4 inch outlets for numerous flexible hose connections at every storey. Great pains were taken in fitting up, and all imperfect holes were reamed with Chicago Little Giant reamers, seven of which were provided for this job. The rivets were heated in oil furnaces provided with compressed air blast and were driven by five to nine five-men gangs, who made a maximum record of 1,300 rivets in 8 hours for one gang and 2,450 rivets in 8 hours for two gangs.

The erection of the steel work is

now practically completed, and the rigidity of the 6,000 ton mass is so great that no vibration has been observed by the workmen at the summit of the slender tower nearly 650 feet above the column bases. The rapidity and efficiency of the steel erection has been largely due to the careful preparation made for receiving and handling the steel in exactly the required order, and in erecting it without rehandling, the different members being swung complete to place in proper sequence without hesitation and the connections immediately made by men who were well trained and competent to carry on the work with confidence and precision, wasting no unnecessary time and completing each operation in readiness for the next.

Great care was taken to maintain a constant rigid inspection of the work and of the condition of the building, so that the scaffolds were always safe, and derricks in good order, and no tools or materials insecurely placed or allowed to fall on the workmen below. Consideration was also had for the comfort as well as the safety of the workmen, and a temporary electric passenger elevation was installed at the commencement of the work, and its guides were extended as fast as the framework was erected, especially to provide accommodations for the workmen who were carried up and down in it to the rapidly increasing height of the building, and thus saved much time and labor which would otherwise have been wasted in climbing ladders or stairs.

The steel erection is now practically completed and is entitled to the enviable distinction of two records, one for the great rapidity of construction and successful completion of a framework nearly double the height of any previous steel building, and the other for the execution of the lofty and difficult work without loss of life or a single serious accident, results which are most creditable to Mr. W. R. Waterbury, general superintendent of the steel erection for the contractors, and Mr. W. Craig, superintendent in charge.

The construction of the walls,

floors, ceilings, partitions and the installation of the equipment followed as rapidly as possible after the erection of the steel work, and was well advanced in the lower part of the building before the last of the many tiers of steel were in position. Heavy decks of the ordinary type were built over the Broadway and Liberty street sidewalks, and were used chiefly for storing and other material and for the occasional temporary accommodation of light pieces of steel work. Underneath them elevated bridges were built to carry pedestrians while work was in progress for the vaults and sidewalks below, and two wide entrances were arranged to the interior of the building, so that trucks could drive in, make a circuit and return continuously through the other as an exit without interfering.

All material for interior construction was delivered by trucks, which unloaded inside the building, where a portion of the cement, fireproofing and other supplies was stored on the first and basement floors, but the greater part was immediately hoisted by four hod elevators to the storeys where it was required. Floor construction was commenced April 15 and was carried on almost as rapidly as the steel erection, being maintained two or three tiers below the latter. All floors are made with National Fireproofing Company's hollow tile flat arches, and had Crown finish, dispensing entirely with wood. Brick laying was commenced April 15th by John F. Brady, & Company, and stonework for the exterior walls of the main building was commenced May 1 and for the tower August 25. Exterior Kavanagh suspended scaffolds operated by the masons were used, and all of the stonework was anchored by galvanized iron bars.

The trim is all pressed steel, and the doors, window frames and sash are kalamined copper, thus eliminating all woodwork except in portions of the old building. The windows in the court and up to the twentieth storey of the tower are glazed with wire glass, and all structural steel is protected by concrete or terra cotta covering.—The Engineering Record.

CEMENT AND CONCRETE

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers]

Expansion and Contraction of Walls

The expansion and contraction of concrete walls was a subject considered a short time ago at the meeting of the Association of Railway Superintendents of Bridges and Buildings in Milwaukee. A committee, consisting of A. S. Markley, R. H. Reid, W. A. Rogers and P. J. O'Neil, made the following report:—

After thoroughly investigating the above subject of expansion and contraction of concrete, your committee finds that with varying temperature some provisions must be made for wall movement, similar to the expansion of steel, though the latter requires more than the former. After innumerable investigations as to methods employed to provide expansion, the committee finds there is no specified rule to govern movements of concrete under these various conditions and temperatures, either natural or artificial, as local conditions and atmospheric changes and natures of structures require.

In walls that are exposed to natural atmospheric changes in temperatures on all sides, provisions must be made for wall movement, more than if only surface is exposed, the other portions being protected by embankment, etc. Retaining walls 200 feet long and over 10 to 20 feet high, should have an expansion joint every 45 to 50 feet, as conditions require them. Concrete curbs 4 to 5 feet wide, 6 inches to 12 inches thick, should have an expansion joint every five feet square.

Reinforcing used in concrete will, to a certain extent, prevent concrete from separating, but will not prevent slight cracks from appearing on the surface. These cracks do not confine themselves to any particular direc-

tion, though usually running vertically and horizontally, the former appearing from 3 to 4 feet apart in curbs 350 feet long, 8 inches high, reinforced with five one-half inch Johnson corrugated bars distributed throughout the curb. The horizontal cracks are not so frequent and irregular. Corrugated bars being partly protected by the concrete from atmospheric changes, make the expansion between the bars and concrete unequal, to which the cracking above referred to is attributed, the two expanding about equally under same temperature and exposure. These cracks are not due to shrinking, which only appears at initial setting of concrete, but to expansion and contraction, they appearing thirty to ninety days after job is completed and after passing through a shrinking period.

Joints in wall and curbs should be made dovetail, so as to maintain a true alignment of the wall on the exposed surface. Various methods are employed in making the joint, one of which is to use a sufficient number of layers of felt paper to obtain the desired thickness and cushion. Another practice, in large retaining walls, is to build each alternate section dovetailed together, allowing each alternate section to be thoroughly seasoned before the succeeding section is built, and allowing disconnected joint to provide expansion in this manner, which appears to be most satisfactory.

Expansion in sidewalks, or similar work, is overcome by cutting through the concrete before finished surface is applied, leaving a space sufficiently filled with dry sand, or open, as desired.

Where artificial or natural temper-

atures are maintained uniformly at all times, expansion joints can be dispensed with, as in subways, dams, smokestacks, buildings, and constructions of similar nature. Tunnels 750 feet long, with lateral tunnel diverging at right angles from centre of main tunnel for 350 feet, through which steam, water and air pipes are hung, have been built and in service for the past three years, and no indication of cracks can be seen. In this case the temperature varied from 110 to 175 degrees inside of tunnel. The tunnel constructions are of concrete 4 1-2 feet wide throughout, 5 1-2 feet deep from surface of ground at one end and 3 feet at terminal, the side walls and bottom 12 inches thick throughout, and the cover four inches, the cover being bonded to sides of tunnel, reinforced with No. 8 expanded metal one inch from lower side and troweled on the surface. The cover is used as a sidewalk and a truckway for trucking material from different buildings, it being at the surface of the ground. In putting on the cover, light expansion joints were made by cutting through concrete every 5 feet of each sheet of expanded metal before putting on top dressing, filling joint with dry sand and one inch below surface. No expansion has taken place whatever in any of these walls, including cover, no provision having been made in side walls or bottom for expansion. Had any taken place, it would have been noticed by cracks appearing on the surface, close observation having been made at intervals of different temperatures of the weather and under all conditions. Even temperatures were maintained by heat from pipe in the tunnel to supply steam, etc., to buildings.

Cement World.

Minneapolis Ordinance Regulating Concrete Construction

The city of Minneapolis has recently passed a new ordinance governing the use of concrete construction, whether plain or reinforced. The ordinance provides for superintendence of construction, the leading portions being as follows:

Section 1.—Every person, co-partnership or corporation erecting any building or structure, within the city of Minneapolis, wherein concrete or reinforced concrete, or a combination of reinforced concrete and tile or other material, is used for the structural members, shall employ, and keep constantly on the work during the construction of any such building or structure, or shall cause to be so employed and kept by the architect or designer of such building or structure, a competent and duly qualified superintendent or inspector, whenever in the judgment of the Inspector of Buildings the importance and magnitude of such building or structure and public safety require the services of such superintendent or inspector.

Such superintendent or inspector, before engaging in the superintendence or inspection of the construction of any such building or structure, shall obtain a permit therefor from the Inspector of Buildings, and before any such permit shall be issued to the applicant therefor, such applicant shall be required to pass a written examination before the Inspector of Buildings as to his ability to correctly read architectural plans and drawings, and as to his knowledge and experience in respect to the proper means, mode and manner of making such construction of concrete, reinforced concrete and combination of reinforced concrete and tile or other materials. Said Inspector of Buildings shall preserve and keep on file all examination papers, and may revoke any permit issued under the provisions of this ordinance if the person to whom said permit is issued fails to perform his duties as required by this ordinance.

Section 2.—Each and every superintendent or inspector employed as

such as herein provided shall carefully inspect all materials entering into, or in any manner used in, the construction of every building or structure upon which he is employed as superintendent or inspector. He shall submit to the office of the Inspector of Buildings samples of the materials entering into the construction of the work upon which he is engaged as such superintendent or inspector, whenever required by the Inspector of Buildings. He shall report in writing to the Inspector of Buildings any and all deviations from and changes in the plans and specifications as approved by said Inspector of Buildings, and all work not performed as required by such plans and specifications. He shall also report any and all attempts made by the contractor or any workmen employed upon any such building to remove the forms and supports of the concrete work before the concrete shall have properly and sufficiently hardened or set, and shall promptly report to said Inspector of Buildings each and every defect in the construction that come to his notice. He shall also notify said Inspector of Buildings of each and every attempt on the part of the contractor or workmen engaged on said construction to cover, patch or repair, during the progress of the work or after its completion, any defect in the construction before such defect shall have been examined by a representative of the Department of Buildings and the manner in which the same shall be covered, patched or repaired duly approved by said representative of the Department of Buildings.

Said superintendent or inspector shall not, while employed as such, perform any manual labor on the work on which he is so employed, for the contractor or other person or persons interested in said building or structure.

Section 3.—Each and every person, co-partnership or corporation engaged in the erection or construction of any building or structure in which

concrete, reinforced concrete, or reinforced concrete in combination with other materials is used, within the city of Minneapolis, who shall violate any provision of this ordinance, or who shall fail to provide and keep permanently on the building or structure during its construction, when ordered so to do by the Inspector of Buildings, such duly qualified and competent superintendent or inspector as herein provided, and each and every such superintendent or inspector to whom a permit has been granted as hereinbefore provided who shall violate any provision of this ordinance, or fail to perform any of his duties as set forth in this ordinance, shall, upon conviction thereof before the Municipal Court, be subject to a fine of not less than ten dollars (\$10) or, upon failure to pay such fine, to imprisonment not exceeding ninety (90) days. The continued violation of any of the provisions of this ordinance shall be and constitute a separate offence for each and every day such violation shall continue.

EFFECT OF HEAT ON REINFORCED CONCRETE.

(1) All concrete mixtures when heated throughout to a temperature of 1,000 degrees to 1,500 degrees F., will lose a large proportion of their strength and elasticity, and this fact must be well remembered in designing.

(2) All concretes have a very low thermal conductivity, and therein lies their well-known heat resisting properties.

(3) As a result of this low thermal conductivity, two to two and a half inches of concrete covering will protect reinforcing metal from injurious heat for the period of any ordinary conflagration (provided, of course, that the concrete stays in place during the fire).

(4) Reinforcing metal exposed to the fire will not convey by conductivity an injurious amount of heat to the embedded portion.

(5) Gravel concrete is not a reliable or safe fire-resisting aggregate.—Professor Ira H. Woolson, in a paper read before the Am. Soc. for Testing Materials.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

CONTRACTS OPEN.

Bonaventure River, Que.

Tenders are invited by Fred Gelinias, Secretary, Department of Public Works, Ottawa, up to December 28th for the construction of a training pier at this place. Specifications at office of J. L. Michaud, Resident Engineer, Merchants Bank Building, Montreal, on application to the local postmaster, at the office of A. R. Decary, District Engineer, Post Office Building, Quebec, P.Q., and at the department.

Brantford, Ont.

A by-law to raise \$55,000 for a distributing plant for power purposes will be submitted to the electors in January.

Dawson, Yukon.

S. A. D. Bertrand, Superintendent of Public Works of the Yukon, left recently to secure the approval of the Government at Ottawa for the rebuilding of the Government House.

Francis, Sask.

A site has been acquired by the school board upon which they will erect a substantial brick school house next year.

Guelph, Ont.

The water works commission are considering Engineer Davis' report on various projected city works which include the installation of pumping machinery, \$16,500; stand pipe, \$22,646; reservoir \$8,418, and conduit, \$67,943.

A new church will be built in this city next spring by the Lutheran body.

It is reported that a stock company, capitalized at \$100,000, has been formed with a view to building a large hotel next season.

Halifax, N.S.

L. F. Monaghan, city clerk, wants tenders up to December 18th for raising the bell tower of West street engine house according to plans and specifications which may be seen at office of W. B. Fidler. Tenders will also be received up to the same date for the installation of heating at Quin-pool road engine house.

Hamilton, Ont.

A large screw factory will shortly be built in this city by the P. L. Robertson Manufacturing Company.

Through the grounding of a wire at the Cataract Power Company's substation, a small fire was started and although there was not much to burn, damage was done by water to the big transformers to the amount of \$1,500.

Harrisburg, Ont.

Now that the dilapidated old station of the G.T.R. has been destroyed by fire the inhabitants are looking to the Company to erect a more commodious building.

Ingersoll, Ont.

At the January elections the ratepayers will vote on a by-law to raise \$50,000 for the purpose of acquiring the plant of the Ingersoll Electric Power and Light Company.

Kemptville, Ont.

A by-law to loan \$5,000 to the Kemptville Milling Company will shortly be submitted to the electors.

Kingston, Ont.

City Engineer Beckwith's report calls for a sum of \$22,000 for macadam roads next year.

Ladysmith, B.C.

The time for the receipt of tenders on the proposed new public building has been extended to December 23rd.

L'Anse a la Barbe, Que.

Fred Gelinias, Secretary, Department of Public Works, Ottawa, will receive tenders up to December 21st for the construction of a wharf at this place. Specifications with local postmaster and at the Department.

Listowel, Ont.

The fire and light committee are considering the installation of an electric light plant.

Londonderry, N.S.

In connection with the Drummond development of the Gloucester iron areas Premier Robinson has been informed by Mr. Drummond that the company expect to produce within two years \$100,000 to \$150,000 tons of ore annually. No less than \$150,000 will be spent in opening up work at this place next season. The management are confident of the prospects of the mines and will put in a large plant.

London, Ont.

It is understood that the construction of the gymnasium, for which \$5,000 has been set aside in the Government's estimates, will be put in hand at an early date.

On January 6th the ratepayers will vote on a by-law to raise \$19,000 by debentures for building fire halls in the north and east end of the city.

Tenders will be received by the finance committee up to December 27th for the \$100,000 local improvement debentures. Ten per cent of the amount desired must be enclosed with application.

Medicine Hat, Alta.

Two of the three by-laws recently submitted have been approved by the ratepayers. These called for \$6,500 for the construction of a spur line for manufacturing sites and for \$40,000 for granolithic pavements. The by-law rejected was to grant an exemption from taxes to the Medicine Hat Milling Company.

Mills Point, N.B.

Tenders are invited by Fred Gelinias, Secretary, Department of Public Works, Ottawa, up to January 10th for building a wharf at this place. Specifications at offices of E. T. P. Shewen, resident engineer, St. John, N.B.; Geoffrey Stead, resident engineer, Chatham, N.B., on application to the postmaster at Hardwicke, N.B., and at the Department.

Mimico, Ont.

Debentures are to be issued to raise \$3,600 for the construction of concrete sidewalks.

Montreal, Que.

The G.T.R. are planning the construction of an extensive terminal at St. Lambert.

Announcement is made by Rodolph Forget to the effect that a large English concern will expend \$10,000,000 in the development of Canadian electrical railways. The scene of the most important operations will be the Island of Montreal. The company will assist in developing the plants of the Montreal Light, Heat and Power Company, the Quebec Railway, Light and Power Company and the Electric Development Company. Electric rail-

ways will be constructed in the rural districts of Ontario and Quebec, and engineers have already completed a tour of inspection.

Superintendent Janin and three consulting engineers, in a special report to the city council, recommend the immediate purchase of a 5,000,000-gallon pump from the Caledonia Iron Works and the purchase of a 12,000,000-gallon pump some time next season. Attention is also directed to the defective condition of three of the four steam pumps now being used. The matter has been referred to the Finance Committee.

The Lithuanian Withold Independent Club has been formed with a capital of \$15,000 for the erection and maintenance of a Lithuanian club house.

Napanee, Ont.

In order to cover the cost of proposed extensions to the municipal lighting plant a by-law for raising \$10,000 by debentures will be submitted to the ratepayers.

New Westminster, B.C.

Plans for the proposed additions to the city market are about completed and tenders will be taken at an early date.

Owen Sound, Ont.

At the municipal elections the ratepayers will be asked to sanction a by-law for granting certain concessions and a loan to the Tedd Shoe Company, of Toronto, for factory purposes.

Ottawa, Ont.

Architect Gilbert announces that everything will probably be in readiness by next month for taking tenders on the superstructures of the central depot and hotel.

Estimates have been presented by the City Engineer calling for an expenditure of \$338,000 for a new aqueduct, high pressure system and intake pipe.

Parry Sound, Ont.

On January 6th the ratepayers will vote on a by-law to loan \$20,000 to the Parry Sound Furniture Staples Company for the establishment of a factory.

Pembroke, Ont.

In connection with the \$25,000 steel bridge project it is probable that a by-law will shortly be voted upon.

Piche Point, Que.

Fred Gelinus, Secretary, Department of Public Works, Ottawa, wants tenders up to January 8th for building a public wharf at this place. Specifications at office of J. L. Michaud, resident engineer, Merchants Bank, Montreal, on application to the postmaster ta Gigues, and at the Department.

Pointe aux Trembles, Que.

Tenders are invited by Fred Gelinus, Secretary, Department of Public Works, Ottawa, up to January 7th for the completion of the landing pier. Specifications at offices of A. R. Decary, resident engineer, post office, Quebec; C. Desjardine, clerk of works, post office, Montreal, on application to the local postmaster and at the Department.

Portage la Prairie, Man.

Considerable building planned for this season has been postponed until the spring. The work in contemplation includes the International Heating and Lighting Company's \$100,000 plant, the new addition of the London Wire Fence factory, erection of distributing warehouses, repair and rebuilding of agricultural implement works and the erection of the Government Industrial School at an estimated cost of \$150,000.

Renfrew, Ont.

Plans for the new post office have been prepared and after their approval tenders will be let. It is hoped to start work early in the new year.

Rigaud, Que.

The newly formed Detonite Explosives Company have purchased a large tract of land from Joseph Wilson upon which they will shortly commence the construction of a \$50,000 plant.

St. Mary's, Ont.

\$8,000 will be expended next season on the completion of the waterworks system.

St. Hyacinthe, Que.

The newly erected building of the St. Hyacinthe Distillery Packing and Vinegar Company collapsed last week causing heavy loss.

St. Thomas, Ont.

A large addition is to be built at the Church of the Latter Day Saints on Balaclava street and a committee which includes S. Pearson and J. R. Shepherd have been appointed to secure plans.

St. John, N.B.

The Provincial Government have instructed W. Hidenbrand, C.E., one of the engineers of the New York and Brooklyn Bridge, to prepare an estimate of the cost of a cantilever bridge over the falls. It is understood that the figure would be in the neighborhood of \$150,000.

Toronto, Ont.

Active steps are being taken towards securing a new University Y.M.C.A. building and a committee have been appointed to negotiate with the Board of Governors for a site.

In connection with the proposed bridge over the tracks at Bathurst street the Parks Department have received the estimate of City Engineer Rust calling for a sum of \$107,000.

Plans have been prepared for commodious public baths to be erected on Stephanie place near St. Patrick's market at a cost of \$40,000 and tenders will be called for at an early date.

Arthur W. Holmes, architect, 10 Bloor street east, will receive tenders up to December 31st for all trades (except heating) in the erection of the proposed St. Helen's church at Dundas and St. Clares. Specifications at architect's office.

A new \$10,000 factory is to be erected on the Don, near Radenhurst, by the Don Paper Mills Company.

There is a rumor going the round of the real estate circles to the effect that British capitalists are contemplating land purchases with a view to extensive building next season.

Recent building permits include: S. Mager, 2-storey brick dwelling, Dufferin street, \$2,200; W. H. Cawthra, 3-storey brick store, Yonge street, \$19,000; William Young, 2-storey and attic brick dwelling, Lippincott street, \$2,700; Lover Bros., Limited, 3-storey brick factory, corner Eastern avenue and Don Improvement, \$45,000; W. N. McEachern, 1 pair semi-detached 2-storey brick dwellings, Wheeler avenue, \$4,000; Dominion Bank, alterations to bank, S.E. corner Avenue road and Davenport road, \$9,000; S. E. VanCamp, 2 detached 2-storey and attic brick dwellings, N.W. corner Riverdale and Logan avenues, \$5,000; Walker House, alterations to hotel, corner of Front and York streets, \$30,000; P. A. Manning, alterations to dwelling, Walmer road, \$7,000; Don Paper Mills company, 2-storey brick factory, Esplanade, \$10,000; J. VanSlicker, 2-storey brick dwelling, Dupont street, \$3,000; A. W. Hodgkinson, 1 pair semi-detached 2-storey rough cast dwellings, Hunter street, \$1,600; J. Russell, 2 pair semi-detached brick dwellings, Smith street, \$8,000.

Upper Woodstock, N.B.

Wm. Downie, General Superintendent, C.P.R. Atlantic Division, St. John, N.B., will receive tenders up to December 20th for building three concrete piers at the Company's bridge, first crossing of the St. John river. Specifications may be seen at offices of C. B. Brown, division engineer, St. John, N.B., or F. M. Rutter, resident engineer, Woodstock, N.B.

Vancouver, B.C.

The Vancouver Power Company will install two units of 10,000 h.p. for their plants at Lake Buntzen and Coquitlam.

C. Jenkins, of Morrisburg, Ont., has been negotiating with the city with a view to the establishment of a large tinplate factory.

A site on Alexander street has been selected for the location of the Otis-Fensom Elevator Company's new building which will cost \$30,000.

Victoria, B.C.

Tenders have just been taken for the erection of a frame school house at Lynn Valley, Richmond electoral district.

A five story building is to be erected at the corner of Yates and Government streets by the Northern Bank.

Winnipeg, Man.

By-laws to raise \$100,000 for public abattoir and stock yards, \$240,000 for the construction of a bridge at Brown and Brant streets, \$200,000 for a conduit system and \$200,000 for recreation grounds, respectively, have been defeated.

Tenders will be received by F. W. Drewry, Chairman of the Parks Committee, up to December 23rd for the construction of a tower and water tank in Assiniboine Park, St. Charles. Plans and specifications at office of J. H. Blackwood, Secretary.

M. Peterson, Secretary, Board of Control, will receive tenders up to January 15th for about fifteen miles of assorted water pipe. Specifications may be obtained at office of H. N. Rutnan, City Engineer.

Woodstock, Ont.

The water and light commissioners have sanctioned the submission of a power by-law that includes \$13,500 for a distribution plant, \$9,000 for an electric motor and \$5,000 for an electric pump.

The Oxford County Council have passed a measure to appropriate \$50,000 for road improvements.

CONTRACTS AWARDED.

Maple Creek, Sask.

The contract for the new post office has been awarded to Snyder Bros., of Regina.

Kiviere du Loup, Que.

The contract for the new I.C.R. repair shops has been awarded to Duke and Dumont at \$89,874.

St. Alphonse, Que.

Heny and Smith have been awarded the contract for the erection of a wharf at this place.

Stratford, Ont.

The successful tenderer for the new locomotive shops of the G.T.R. was Arthur E. Rendle, of Montreal.

Toronto, Ont.

John E. Webb has secured the contract for the erection of the avenue road branch of the Dominion Bank. Architects, Carrere, Hastings & Bird.

Victoria, B.C.

Hanson and Holmes, of Sunbury, B.C., secured the contract for the Annieville school at \$1,800.

FIRES

Buildings of J. J. Mohr, M. A. Dutcher and J. McMaster and Sons, Vegreville, Alta., loss \$50,000.

Factory of Peel and Pickford, Point St. Charles, Montreal, Que., loss \$3,000.

Factory of Richard Hemsley Manufacturing Company, Montreal, Que., loss \$10,000.

Warehouse and elevator of the Western Canada Flour Mills Company, Vonda, Sask.; loss not ascertained.

Dwellings and stores at Omeme, Ont., total loss \$12,000.

Building, machinery and stock of the Elliot Manufacturing Company, Toronto, Ont., loss \$150,000; losses to adjoining property \$10,000.

Woodbine Planing Mill, Toronto, Ont., loss \$18,000.

Hotel and outbuildings, also Berger's livery stable and Maddin's store, at Beausejour, Man., loss \$20,000.

Storehouse of Lachute Shuttle Company, Lachute, Que.

Buildings of Smart-Turner machine shops, Hamilton, Ont., loss \$3,000.

NEW COMPANIES.

Automatic Vending Company, Limited, London, Ont., incorporated, capital \$50,000. Incorporators, G. H. Townsend, of Smithville, Ont., W. L. Trusler, of Toronto, and others.

Thomas A. Norris Company, Limited, Toronto, Ont., incorporated to take over the plumbing business of Norris and Company, capital \$40,000. Incorporators, R. J. McGowan, Charles Winfield, J. O. Poole, and C. F. Brooks, all of Toronto.

Electric Securities Company, Limited, Toronto, Ont., incorporated as manufacturers of electrical machinery and as a guarantee company, capital \$300,000. Incorporators, A. M. Manson, J. M. Langstaff, D. J. Cowan, Joseph Goudy and Charles L. Corin, all of Toronto.

A. & C. Boehmer, Limited, Berlin, Ont., incorporated as paper and cardboard box manufacturers, capital \$40,000. Incorporators, A. Boehmer, George Boehmer and A. B. Pollock, all of Berlin, and others.

Industrial Natural Gas Company, Limited, Welland, Ont., incorporated, capital \$40,000. Incorporators, Thomas Coulter, R. Ross, W. A. Gibb, B. Tucker, B. J. MacCormick and others.

Brand - Electro - Ozone, Limited, Toronto, Ont., incorporated to manufacture electrical supplies and scientific instruments, capital \$100,000. Incorporators, R. W. Hawkins, I. Harris, S. A. Freeman and H. Marshall, all of Dereham, Ont.

Princeton and Drumbo Telephone Company, Limited, Princeton, Ont., incorporated, capital \$20,000. Incorporators, F. J. Daniel, W. H. Wells, Thomas Conway, D. Blackmore and others.

Gould Consolidated Mines, Limited, Ottawa, Ont., incorporated, capital \$2,000,000. Incorporators, James Wilson, J. K. Paisley, Daniel O'Connor and F. W. Bindon, all of Ottawa.

BUSINESS NOTES.

The statement of William Malloch & Company, the London elevator firm who recently became financially embarrassed, shows assets of nearly \$50,000 against liabilities of about \$15,000. On account of this large surplus the creditors have given the firm an extension of time.

Alderman Stevely's idea about the popular loan at the Forest City is reaching its consummation. Last week the finance committee decided to advertise the sale of \$100,000 local improvement debentures and \$60,000 sewer debentures in allotments of \$100 up.

J. A. Petit and Company, plumbers, Levis, Que., have registered.

Langevin and Lemelin, contractors, Montreal, Que., are reported to have assigned; the City Operating Company, general contractors, same city, have registered.

The Wentworth Real Estate and Building Company, Limited, Hamilton, Ont., have obtained a charter.

Wood, Gundy & Company, Toronto, have just secured two very desirable issues of Ontario city debentures, viz., \$23,000 City of Peterborough 4½ per cent 30-year debentures and \$24,000 City of Guelph 5 per cent 20-year debentures.

Oscar Daoust, plumber, Montreal, Que., has assigned.

A new lumber firm has been formed at Montreal by the Canadian Supply Company in connection with which L. A. Croteau and J. A. Piche have registered.

The Stratford Fuel, Ice, Cartage & Construction Company, Limited, Stratford, Ont., have assigned; creditors meet December 19th.

S. Gosselin & Company, plasterers, Montreal, Que., have registered.

The lumber firm of Cann & Ingle, Stony Plain, Alta., have been succeeded by Ingle & Miller.

Mayer & Ouimet, contractors, Montreal, Que., have dissolved partnership.

Larin & Guerard, plumbers etc., Montreal, have registered.

BUILDING NEWS.

At Yellowgrass, Sask., in the operation of recent drilling work the discovery of a fire clay deposit was accidentally made. The clay was found at an average depth of about fifteen feet and it extends over about fifteen acres to a depth of forty-two feet. Experts have estimated the amount of clay in the main deposit at 1,500,000 tons and it has been pointed out that this supply would last for fifty years even if taken out at the rate of one hundred tons per day. A company has been formed to develop the property and active operations will be commenced in the spring. This should mean the opening up of a large new industry in the manufacture of fire brick, sewer pipe and other fire clay products.

A huge scow was recently sent by Haney and Miller to the Port Credit Brick Works for brick and during the day some 57,000 bricks were loaded as the scow lay at anchor off the brick works. When morning broke, however the scow was not in sight and examination proved that she had gone to the bottom. The stone-hooker fleet was called into requisition and all was eventually recovered.

On Sunday morning last the Queen City lost nearly \$180,000 by fire in the course of a few hours. Simultaneously with a big conflagration at the Elliot Manufacturing Company's box factory on Richmond street, which occasioned a loss of \$160,300, there occurred an \$18,000 blaze at a planing mill on Woodbine avenue. The insurance on the former building is \$121,000 and on the latter \$14,000. No watchman was on the premises and the cause of the fire is unknown.

The attention of the Winnipeg Board of Control has been called to the danger of fire from vacant buildings not properly closed up. The Provincial Fire Commissioner reports the origin of the Rat Portage Lumber Company's fire to have been in a vacant structure into which fell sparks from a C.P.R. locomotive. An amendment will accordingly be made to the building by-law by which the building inspector will be given power to enter and secure all vacant buildings, charging

any expenses to the property owners. It is thought that the general danger from fire will be greatly lessened thereby.

What is claimed to be the largest flour mill in the world was recently opened at Kenora, Ont., by the Maple Leaf Flour Mills Company.

G.T.P. construction near Saskatoon was suspended for the winter a few days ago. It is understood that this was occasioned by a shortage of materials.

The report of the building inspector at Stratford, Ont., chief Myers, of the fire department, for the past year shows an increase in permits of \$251,642 over 1906.

Building permits issued in Montreal up to November 30th total \$8,202,309. For the same period of 1906 the figures were \$8,569,983.

The widow and six children of Denis Perrault at Montreal have secured compensation of \$3,000. Perrault was killed whilst repairing an elevator at the Temple Building.

At the International Convention of the brick layers' union which will be held in Detroit next January the proposal is to be made for the adoption of an eight hour working day for bricklayers in Canada and United States.

The municipality of Verdun, Que., are bringing an action against the city of Montreal to obtain an indemnity of \$3,000 for damage caused by the overflowing of the tail race discharge canal from the city pumping station in 1904.

Eight hundred miles of Grand Trunk Pacific are under construction between Winnipeg and Edmonton. East of Winnipeg 860 miles are being built. The estimated cost of construction from Winnipeg to Edmonton is \$18,400,000, to Edmonton and to the coast \$60,700,000 and from Winnipeg to Moncton, \$41,946,288. The ascertained mileage from Moncton to Winnipeg is 1,804 miles, from Winnipeg to Edmonton 800 miles and from Edmonton to the coast approximately 940 miles.

In the construction of an enlargement to the St. Joseph's Hospital at Victoria, B.C., a dispute occurred a short time ago between some fifty bricklayers and masons as to who should lay cut stone on the work and the difference resulted in their all quitting work. Each union was obdurate in its claim to lay the stone and what should have been a simple matter to adjudicate, had it been properly handled, brought delay to the contractors and unnecessary loss to the men. It is to be regretted that the unions do

not endeavour to work in more harmoniously with the employers in such matters, for although delay often occasions great anxiety to the contractor it is the workman who is invariably the loser in the long run.

The building department of New York city have completed a census of high buildings in that city. Since 1890 no less than 540 have been erected, including the Metropolitan Life Building, which is not finished. The list is as follows; one of forty-eight storeys, one of forty-one, two of twenty-six, three of twenty-five, two of twenty-three, four of twenty-two, nine of twenty, two of nineteen, nine of eighteen, two of seventeen, nineteen of sixteen, nineteen of fifteen, eighteen of fourteen, thirteen of thirteen, one hundred and sixty-nine of twelve, one hundred and one of eleven, and one hundred and sixty-four of ten.

Fire losses at London, Ont., during the current year only amount to some \$20,000. In 1906 the damage was just double this sum which is the lowest loss incurred by the flames in the Forest City for thirty years.

Work is being rapidly pushed forward on the new Provincial Government building at Edmonton, Alta., and the concrete footings are now being put in. The new temporary building for the Government offices in that city is now occupied.

In this issue will be found a part schedule of the various public works of the ensuing season, for which the Government estimates over reach the high mark of one hundred and nineteen millions—nearly three millions in excess of last year. It will be noticed that \$30,000,000 has been set aside for the National Transcontinental Railway and that harbor improvements also come in for a very large sum. The total amount for public works chargeable to income is \$9,094,050, of which sum the province of Ontario receives \$727,500 for public buildings out of a total of \$1,067,000. We might call attention to the \$13,000 required for increased accommodation at the Toronto Armories. The list will be concluded in our next issue.

Recent tests made at the works of the Perfection Concrete Co., Winnipeg, to blocks which were subjected to a pressure of one hundred tons are interesting. A block taken directly from the press was placed on the floor and then loaded by having sand placed in a barrel on the block. A total weight of one thousand pounds was sustained before the newly-made block gave way. The block was the usual nine inch block, having 8 in. x 24 in. face, and is a striking proof of the value of a thorough packing of the material.



[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers.]

Bursting Strength of Malleable Iron Pipe Fittings

By S. M. CHANDLER.

A number of tests were recently made by the writer at the laboratories of the Pittsburgh Valve & Fittings Company to determine the bursting strength of 4 inch standard, screwed, malleable iron tees, black and galvanized. Following are given the ultimate test pressures at which these fittings failed, together with the weights of fittings tested:—

Test No.	Black or Galvanized.	Ultimate Test Pressure	Weight, Pounds
1	Black.	2900 lb	10.06
2	Black.	3100 lb	10.12
3	Black.	2900 lb	10.19
4	Galvanized.	2700 lb.	10.62
5	Galvanized.	3000 lb.	10.50
6	Galvanized.	2800 lb.	10.75

The bodies of all fittings were 1-4 inch in thickness.

The average bursting pressure of the black fittings was 2,900 pounds, and of the galvanized fittings 2,833 pounds. As these tees were recommended for a working pressure of only 150 pounds, they therefore had a factor of safety of 19.3 for the black fittings and 18.9 for those galvanized, with a general average factor of safety of 19.1 for black and galvanized together. This is ample where the fittings are used at pressures recommended by the manufacturer and would even allow of safe usage at still higher pressures.

It is interesting to note that the galvanized fittings failed at practically the same pressures as the black. This is contrary to the expressed belief of many users of malleable fittings, who were very positive in their statements that galvanizing greatly weakened the strength of pipe fittings. Adherents to this theory claimed that dipping malleable fittings into a bath

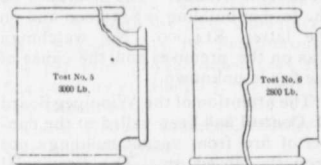
of molten zinc, and then suddenly cooling by immersing them in cold water, had a tendency to make the castings hard and brittle, bringing them back to the unannealed state. That such a theory is false is shown conclusively by the above tests, leading one to infer that the temperature to which castings are raised for galvanizing is not sufficiently high to injure them when suddenly cooled, providing of course that the castings have been properly annealed in the first place.

A comparison of the bursting strength of cast iron and malleable iron fittings as used commercially can be obtained by referring to a series of tests, made by the writer on cast iron fittings, which were the subject of an article appearing in the October, 1905, number of "Power." Here it was shown that three 4 inch standard, screwed, cast iron tees were tested to destruction, failing at an average bursting pressure of 1,867 pounds. As the average bursting pressure of the six 4 inch malleable fittings referred to above was 2,867 pounds, they were therefore about one and a half times as strong as those made from cast iron. While tests to support this statement were only made applying to 4 inch sizes, it is probable that the same ratio would be approximately correct for all standard sizes as the patterns for both the malleable iron and the cast iron fittings were made from one general design.

In most cases the malleable fittings developed leakage through minute "pin holes" at pressures ranging from 1,000 to 2,500 pounds. In no in-

stance were these pin holes visible below a pressure of 1,000 pounds with the black, or 2,000 pounds with the galvanized fittings, while two of the galvanized fittings sustained pressures of 2,500 pounds before pin holes developed. It was therefore evident that the galvanizing was very effective in closing the pin holes, which are generally characteristic of malleable iron fittings when used at high pressures.

A feature of interest that developed in these tests was the stretching of the metal in the fittings as the pressure increased. Careful measurement of the body of the tees with calipers before and after the application of pressure showed that the diameter had increased from 1-8 to 1-4 of an inch. This stretch caused excessive leakage in the threads of the fittings at the higher pressures and made considerable trouble and annoyance in conducting the tests. On this account it was found advisable to raise the pressure, in making the tests, as quickly as possible, as in so doing the fittings were fractured before they had had time to stretch and leak to any great extent. This sudden application of pressure no doubt had a tendency to produce failure of the fittings at lower pressures than if the pressure had been applied gradually without



shock. This difficulty could have been avoided by screwing the plugs farther into the tees when the pressure had reached a point slightly below that at which the fittings were expected to fail. Such a procedure would, however, be accompanied with danger, as

any air entrained in the tee might cause a disastrous accident with probable loss of life in case of premature bursting of a fitting.

The accompanying sketch shows characteristic fractures of the fittings tested. Most of the tees failed as in Test No. 5, cracking through the beads at one end and the side outlet of the fitting. No pieces of metal were entirely separated from the tees when they failed, as was the case with the cast iron fittings. The malleable iron fitting, being tough and slightly elastic, was simply torn apart while the cast iron fitting, being more brittle, broke in many cases into separate and distinct pieces. These tests show plainly the superiority of malleable over cast iron for use in the manufacture of pipe fittings of small size.

PUTTYLESS GLAZING.

The system of Puttyless Glazing known as the National System, invented and patented by a structural engineer from New York, is now being manufactured in the Dominion under Canadian patent rights, the growth of our industries having provided a field for the manufacture of this system. Many thousands of feet of this system have been installed throughout the United States, and the satisfactory results obtained will doubtless interest engineers and architects in this country.

The features of this system are well adapted to glazing, being designed and worked out with the evident knowledge of the requirements of a

perfect skylight, thus mechanically meeting in every way the demands made upon such construction.

Of the most practical and unique features of the many which are claimed for this system, may be mentioned: The flexible bearing for the glass which is attached to the side stems of the steel bars, which form a resilient or yielding bearing for the glass; this bearing consists of asbestos fibre, enclosed so that it is protected from the weather at all times, thereby remaining permanently flexible. The spring surface bearing cap, which forms a yielding or spring-like bearing upon the glass, provides a broad surface in perfect contact with the glass; while the vertical legs of the caps keep the glass free from binding or coming in contact with any rigid surface; and the steel expansion clip which allows the bars to expand or contract and to move freely when affected by vibration, thus obviating the breakage of glass.

This system is wholly free from the use of putty, roof cement or any other filling substance which would bind the glass, causing breakage, and which must of necessity crack and disintegrate in time, causing leakage and expensive repairs.

We are informed that the cost of this system is moderate and not in excess of the usual skylight construction.

This system has been used in several buildings for the United States Navy in the Navy Yards, the shops for the New York, New Haven &

Hartford Railroad at Readville, Mass., the Waterside Power Station for the New York Edison Electric Company, and many other important buildings.

The manufacturers, Burke & Schalkenbach, 396 St. Denis street, Montreal, will be pleased to furnish information, prices and details. Their standard detail sheet will be mailed upon request and would be added information to every architect and engineer's office.

WIND PRESSURE.

Messrs. Stanton and Bairstow have recently made some experiments at the National Physical Laboratory, London, which bring out a new and practically very valuable fact, namely, that pressure is not the same on large surfaces as on small experimental models. If, for example, a given wind velocity is brought to bear on a square foot of surface it will be 18 per cent. less per square foot of surface than if it were directed on 100 square feet of surface. It was demonstrated, too, that this relation is constant for flat forms, however complicated. A builder or engineer who knows that a structure may be exposed to a wind of eighty miles per hour and that the pressure per square foot as determined by model is, say, x pounds, should allow for his larger construction 20 per cent. extra. The reason for this seems to be the more thoroughly reduced pressure on the lee side of a larger area.

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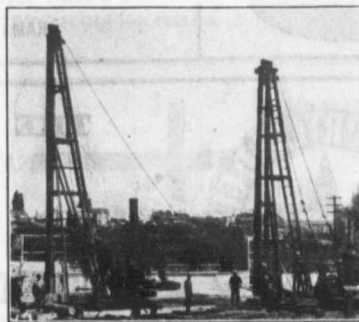
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PROTECT NIAGARA BRIDGE.

Plans of eminent engineers, made with all due care for the protection of the north abutment of the upper side of Niagara Falls were found wanting last week when submitted to the critical test. The waters from the outlet of the tunnel of the Niagara Falls Power Company have been threatening the abutments for some time, and it was decided to protect it from erosion by lacing the abutment with a shield or armor plate. Accordingly 12 plates, each weighing a ton, were securely riveted together, and lowered over the side of the bridge by means of five cables. When the shield struck the water the tremendous force of the current doubled it up like a bit of paper and snapped four of the five cables. The engineers, seeing the uselessness of the device, ordered the fifth cable cut, and the 13 ton plate now reposes on the bottom of the river. How to protect the abutment is a serious problem. An effort to build a concrete retaining wall was given up as a failure, and now the second plan has proved futile.

HAMILTON FIRM'S EXPANSION.

Great improvement has been made of late in the buildings and plant of the B. Greening Wire Company, Hamilton, so that the former now occupy portions of three separate blocks. One of the most important additions is the new weaving mill, a saw toothed roof building, 260 by 130 feet. Here are installed all the heavy looms and a number of supplementary screen cloth looms. In course of time it is intended by the firm to transfer to this new building their entire screen cloth plant, which will permit of them adding to the wire mill the old weaving mill on Napier street. The space between the old weaving and wire mills on that street is now occupied by a cleaning room for the wire mill.

Besides the manufacture of wire, the B. Greening Wire Company make all kinds of wire cloth, from the heaviest varieties used for locomotive stacks and refuse burners for saw mills to the fine wire cloth used for flour mills, office window blinds, mining purposes, car ventilators, etc. They also make steel wire chains of all descriptions and for all purposes.

For all these goods the demand has recently become so great that it was found necessary to open an eastern office at 422-4 St. Paul street, Montreal, of which Mr. J. H. Hanson is in charge.

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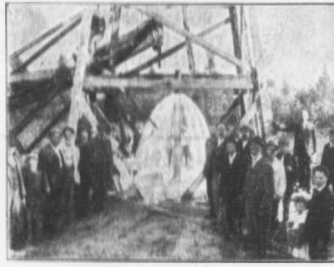
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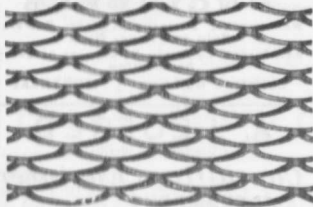
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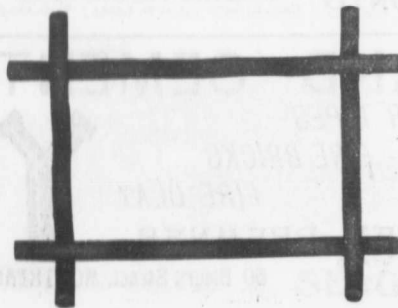
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**DOMINION GOVERNMENT ESTI-
MATES FOR 1908-9.**

(Continued from Page 14.)

fice, postal station "C," Government
share of cost of pavements, etc., \$500;
Toronto Union Postal Station, site,
\$50,000; Welland Public Building,
\$20,000; Whitby Public Building,
\$15,000.

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\$20,000; Dauphin Public Building,
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\$10,000; Emerson Public Building,
\$3,500; Neepawa Public Building,
\$10,000; Selkirk Public Building,
\$30,000; St. Boniface Public Build-
ing, \$20,000; Winnipeg District Military
Stores Building, \$5,000; Winni-
peg Dominion Buildings, improve-
ments, repairs, etc., \$5,000; Winni-
peg new Examining Warehouse, \$30,-
000; Winnipeg new Immigration
Building, including additional land,
\$2,000; Winnipeg Military Buildings,
hospital, \$13,000; Winnipeg Military
Buildings, quarters for married non-
commissioned officers and men, guard
room, etc., Fort Osborne barracks,
\$35,000; Winnipeg new Post Office,
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peg postal station "B," north of C.
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provements, repairs, etc., \$10,000;
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dian Head Forestry Station, addition
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Yukon Territory.—Dawson, Commissioner's residence, \$20,000.

(To be concluded in next week's issue)

A ROOFING FOR SKATING RINKS.

During the past few months a number of up-to-date skating rinks have been built in various parts of Ontario. One of the greatest difficulties in such buildings in the past has been in getting suitable roofs—roofs that would wear well and retain their weatherproof qualities. The problem appears to have been solved at last, however, by the general adoption of sheet metal. The new rink at Forest, Ont., has a large circular roof, which has been covered with "Acorn Quality" corrugated galvanized sheets, manufactured by the Metal Shingle & Siding Company, Limited, Preston, Montreal and Toronto. At Orillia there is a new rink, 184 feet long, with a hip roof, covered with the same material, besides the rinks recently built at Thornhill and Dunville, and the new rink at the Mimico Industrial School. In all large roofs, where it is desired to combine fireproof and weatherproof qualities, with durability and low cost, this style of roofing is to be strongly recommended.

A six car load shipment of this roofing for the new plant of the Great Lakes Portland cement Company at Port Colborne, Ont., has also just been completed, while the same material will be used in the construction of the Vulcan Portland Cement Company's new works at Longue Point, near Montreal.

The advertisement of the National System Puttyless Glazing should have appeared in our issue of December 11th, but went astray in the mails. It appears in this issue and should prove of interest to our readers.

Portland Cement

Monarch Brand



Highest quality—guaranteed to fulfill the requirements of specifications for Portland Cement approved of by the Canadian and American Societies of Civil Engineers.

Prompt shipments from mill or stock at Fort William and Port Arthur.

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"Lehigh" Portland Cement

Capacity 20,000 Barrels Per Day.

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"Neat tests are of less value than those of the briquettes made with sand and cement. The fineness of the cement is important, for the finer it is the more sand can be used with it."

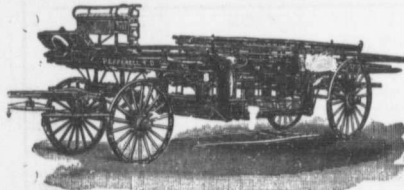
(Abstract from "Specifications for Portland Cement," issued by the United States Navy Department, June 12, 1905.)

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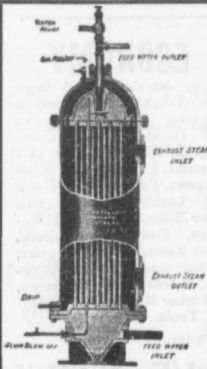
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HUGE STEEL PLANT.

Americans have obtained the contract for the designing and engineering work for one of the largest iron and steel plants ever built outside the United States. The plant will cost nearly \$10,000,000, and is to be located in British India, where the estimated cost of the production of the various iron and steel products will be less than one-half that of the most favored American steel making concerns. This will eventually mean, besides making India independent of outside supplies of rails, that the projected works will prove a most formidable competitor with American, European and Japanese steel interests.

EXTINGUISHING SMALL FIRES.

There never yet was a fire that might not have been extinguished by a single pail of water if taken in time. Too often, however, the small quantity of water at command is wasted by being thrown out all at once, oftentimes missing the mark owing to excitement. The proper way is to throw it rapidly on in repeated small quantities, and for this purpose a tin dipper with a long handle is a very good utensil. Better still is one of the small hand pumps which are made so that they can be attached to a pail.

MIXING PLASTER OF PARIS.

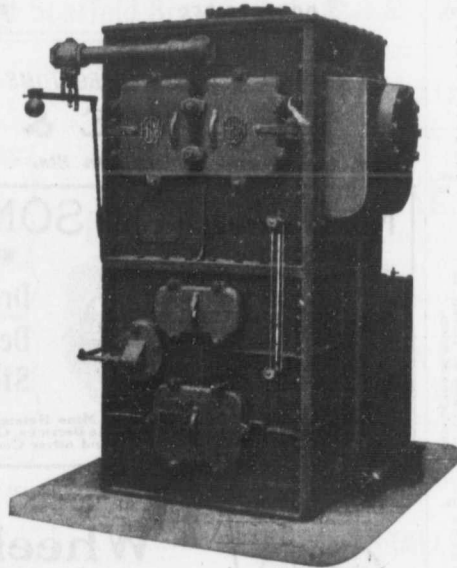
Almost everyone has to mix up gypsum or plaster of paris once in a while, but few know how to do it so as to make a smooth cream, or thin dough, without lumps. The trick is not to pour the water on the plaster, but to turn the latter gradually into the water, spreading until all the plaster has been added. The proper quantity of gypsum is usually enough to peep out over the surface of the water over the greater part of the area; that is, about equal volumes of each ingredient. The addition of glue water to the mixture retards setting. —Robert Grimshaw, in "Machinery."

Bricks made of sand and lime and hardened in the air are used largely in communities where there is no clay from which clay brick can be made, but where an abundance of sand can be found.

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Utilize Waste Steam to
Make Feed Water Hot

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Water
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Time



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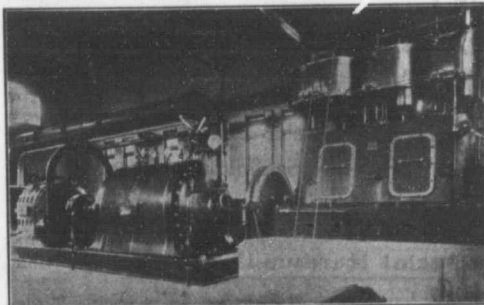
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Brown.....	30 00
Roman Red.....	35 00
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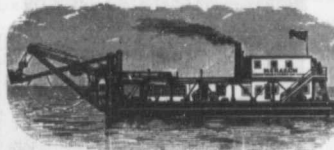
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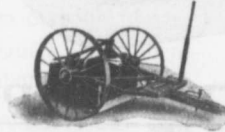


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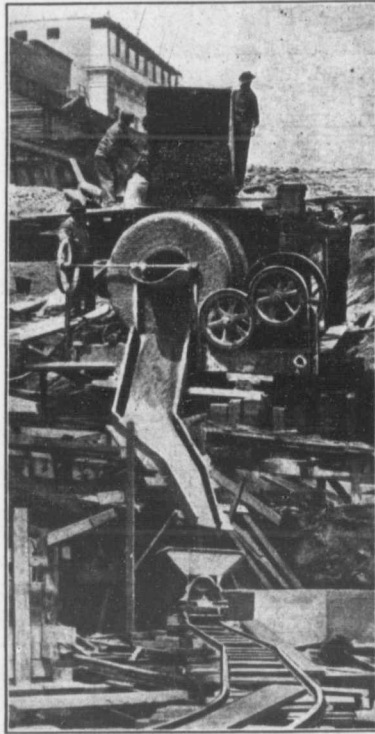
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