

CANADIAN CONTRACT RECORD

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

This Paper Reaches Every Week the Town and City Clerks, Town and City Engineers, County Clerks and County Engineers, Leading Civil Engineers and Contractors throughout Canada, and Purchasers of Municipal Debentures.

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THE CANADIAN CONTRACT RECORD

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TENDERS FOR BELL

will be received by the undersigned up to the hour of 4 o'clock p.m. on THURSDAY, DECEMBER 6TH, 1906, addressed to Chatham, Ontario, for a bell weighing about 2300 pounds, same being in first class condition in every respect, and of superior tone.

Tenders may state a price per pound or a lump sum.

W. G. MERRITT,
City Clerk.

PLANS WANTED

The Dresden Public School Board invite architects to submit competitive plans for a Ten-Roomed School Building. Plans to be in the hands of the Secretary on or before DECEMBER 25TH, 1906. Fuller particulars regarding requirements will be furnished on application to

G. A. MILLER,
Secretary.

TOWN OF FORT WILLIAM

BOARD OF WATER AND LIGHT COMMISSIONERS

Sealed tenders addressed to the undersigned and endorsed "Tender for Water Works," for the construction of Section 3 of the Loch Lomond Water Supply, will be received up to 6 o'clock p.m. on WEDNESDAY, DECEMBER 13TH, 1906.

The work will consist of about five hundred feet of thirty-six (36) inch steel intake pipe, 4,500 feet of concrete-lined tunnel, 4,000 cubic yards excavation, concrete forebay, valves, etc.

Forms of tender may be obtained and plans and specifications inspected at the office of H. S. Hancock, Town Engineer.

The lowest or any tender not necessarily accepted.

A. McNAUGHTON,
Secretary.

Fort William, November 21, 1906.

CONTRACTS OPEN.

ELMVALE, ONT.—C. E. Copeland is about to erect a new saw mill.

TOLEDO, ONT.—A new Roman Catholic church is to be built here.

SYDNEY, N. S.—The Gulf Lumber Company will erect several new buildings.

SEAFORTH, ONT.—Asphalt pavements will be laid on Main street, to cost \$26,500.

FORT WILLIAM, ONT.—A large brewery will be erected here at a cost of \$75,000.

GUELPH, ONT.—Debentures will be issued for \$5,000 for sidewalks and sewerage work.

MEDICINE HAT, ALTA.—J. L. Brown will erect a three story hotel on Montreal street.

SUDBURY, ONT.—St. Josephs Roman Catholic hospital will be enlarged, cost \$40,000.

KINCARDINE, ONT.—The Grand Trunk Railway Co. will shortly erect a new station here.

DUNDAS, ONT.—The Toronto, Hamilton & Buffalo Railway may build a new station here.

HUNTSVILLE, ONT.—J. D. Brown has purchased a site on which he intends to erect a factory.

WALKERTON, ONT.—It is probable that an armoury will be erected here in the near future.

MILLTOWN, ONT.—The ratepayers recently voted against a by-law to install a fire alarm system.

CHARLOTTETOWN, P. E. I.—The city will issue debentures for \$15,000 to replace those redeemed.

CAISTORVILLE, ONT.—New concrete abutments will be erected for the bridge west of the town line.

GLACE BAY, N. S.—The Dominion Coal Company will shortly erect large stables and a wagon shop.

STONEWALL, MAN.—The Council are considering the advisability of installing an electric light plant.

STRATHCONA, ALTA.—C. L. Bailey, of Cobourg, Ont., purposes to build large soap works here.

LACOMBE, ALTA.—The Methodist congregation here are about to erect a new church to cost \$10,000.

VRIDEN, MAN.—Debentures will be issued for \$5,000 to pay the cost of completing the school house.

EGLINTON, ONT.—The Bank of Montreal have purchased a site here and will erect a building thereon.

DEAD LAKE, ONT.—The Northern

Ontario Consolidated Copper Co. are about to erect a large smelter.

CALGARY, ALTA.—Perfection Lodge, A. F. & A. M. are discussing the erection of a six story block to cost \$85,000.

NELSON, B. C.—Knowler & Macaulay have purchased two lots on Baker street and will erect a brick block thereon.

SWANSEA, ONT.—The Salvation Army have acquired a site on which they will erect a substantial brick building.

SELKIRK, MAN.—The ratepayers will vote on a by-law on December 18th to install a municipal telephone system.

PORT HOPE, ONT.—The Bank of Montreal have acquired a site here on which they intend to erect a building.

WOLFVILLE, N. S.—A public meeting has been called to discuss the installation of a municipal lighting system.

ST. CATHARINES, ONT.—The Sovereign Bank will erect a building on the site of the old Niagara Central office building.

BLENHEIM, ONT.—The question of installing a waterworks system may be voted on at the next municipal elections.

PETERBORO, ONT.—It is reported that the Quaker Oats Company will make extensive additions to their present premises.

REGINA, SASK.—Drs. Johnston & Cullum have had plans prepared for a new private hospital to be erected here next year.

ELMIRA, ONT.—A by-law was carried here authorizing the expenditure of \$25,000 for an extension of the waterworks system.

PORT COLBORNE, ONT.—It is reported that the Great Lakes Cement Co. have leased land here on which to erect their works.

ARCOLA, SASK.—J. S. Bush, Town Secretary, will receive tenders up to December 1st for the purchase of \$35,000 1/2 per cent. debentures.

RED DEER, ALTA.—Authorities are considering the advisability of erecting a bridge over the Big Red Deer River west of the town.

PORTAGE LA PRAIRIE, MAN.—A large station and freight sheds will be erected here by the Grand Trunk Pacific and Midland Railways.

LADNER, B. C.—The farmers of Ladner will combine with the farmers of Lulu Island for the purpose of constructing a telephone system.

KILDONAN, MAN.—The question of erecting a bridge across the Red river, at cost of \$100,000 will be submitted to the ratepayers on December 18th.

NORTH TORONTO, ONT.—A by-law will be voted on by the ratepayers to raise \$10,000 for the installation of fire alarm and incandescent lighting system.

PEMBROKE, ONT.—Plans prepared by the town engineer for the laying of a new intake pipe have been approved of by the Provincial Board of Health.

NEW WESTMINSTER, B. C.—The Board of Trade will seek financial assistance from the Dominion Government for building a bridge over the Fraser river.

MIMICO, ONT.—A building 153 x 66 ft. having a gallery with seating capacity for 200 will be erected by the Victoria Industrial School at a cost of \$3,000.

POR T ARTHUR, ONT.—H. Matthews, architect, Winnipeg, will shortly call for tenders for the erection of buildings for the Meisel Manufacturing Company.

AMHERSTBURG, ONT.—J. H. C. Leggat, Town Clerk, will receive tenders up to December 4th for purchase of \$12,442.45 local improvement debentures.

BELLEVILLE, ONT.—The City Council have decided to engage the services of an engineer to report on the cost of installing a general sewerage system.

WESTASKIWIN, ALTA.—The installation of a sewerage system, the laying of several sewers and erection of two hospitals to cost \$25,000, are proposed for next year.

WELLAND, ONT.—The Robertson Machinery Company, at a meeting of the directors recently, decided to erect several new buildings in connection with their plant.

LEAMINGTON, ONT.—The Leamington Electric Light Co. have applied to the council for a thirty year franchise. They intend to remodel and enlarge their plant.

BRANTFORD, ONT.—The Brantford Starch Company will add two stories to their factory.—Pratt & Letchworth will erect additions to their premises to cost \$6,000.

GRAVENHURST, ONT.—Plans will be prepared for the erection of a new administration building for the Muskoka Free Hospital for Consumptives, cost \$15,000.

KNOWLTON, QUE.—The Orford Mountain Railway Company are seeking permission from the Dominion Government for an extension of time in which to construct their line.

BARRIE, ONT.—W. A. Boys, Solicitor, will seek incorporation for the Barrie & Orillia Railway Co., to construct lines from Grenfell to Barrie, Barrie to Orillia, and branches.

HENSALL, ONT.—A by-law will be submitted to the voters of the Township of Tuckersmith for permission to raise \$15,000 by debentures for construction of bridges. A. G. Smillie, Township Clerk.

BRACEBRIDGE, ONT.—T. T. Simpson, C. E., Ottawa, Ont., has made application to the Minister of Lands, Forests and Mines, for permission to develop water power at South Falls, on the Muskoka river.

ARCOLA, SASK.—The time for receiving tenders for purchase of \$30,000 5½ per cent. waterworks debentures and \$5,000 5½ per cent. town hall debentures has been extended to March 1. J. S. Bush, Secretary.

BRANDON, MAN.—A new rink is to be erected here 200 x 116 feet. Plans have been prepared by W. R. Marshall.—It is reported that a brick block will be erected on Princess street. The site was recently purchased by F. Nation.

LONDON, ONT.—A by-law will be submitted to the ratepayers for permission to raise \$575,000 by debentures for water works extension.

LACHINE, QUE.—The Manufactures Cotton Company are asking for a bonus of \$25,000 and exemption from taxes for 25 years. If the council grants their request they agree to build a factory to cost \$800,000.

WINDSOR, ONT.—The Distilled Water Ice Company has been formed to carry on the business of manufacturing artificial ice. Their plant will cost \$65,000. The promoters are Geo. E. Osler, R. Druland, and W. H. Everett.

STRATFORD, ONT.—The City Council have recommended the construction of concrete sidewalks to cost \$1,134.—The Water Commission have recommended the purchase of a new tubular boiler to be installed in the pumping station.

MORRIS, MAN.—A by-law will be submitted to the ratepayers to raise the following sums by debentures: \$7,500 for installing a gas plant; \$3,500 for the construction of a bridge across the Red river; \$15,000 for the purpose of retiring the present debentures held by the C. P. R.

LETHBRIDGE, ALTA.—The City Council have made an agreement with the Alberta Light Co. to bore for natural gas. The company's expenditure will be in the neighborhood of \$10,000.—Tenders will shortly be called for the erection of covered grand-stand for the Lethbridge Athletic Association.

PRINCE ALBERT, SASK.—W. H. MacBeth, of Edmonton, has purchased the Prince Albert Hotel and will extensively remodel same. He will also erect a new hotel next spring.—The Public School Board will ask architects to submit plans for a new Collegiate Institute.

DURHAM, ONT.—Rev. A. A. Bice will receive tenders up to December 1st for mason work, carpenter work and painting required in the erection of an English church in the township of Egremont.

ST. THOMAS, ONT.—The St. Thomas Canning Company will erect several new buildings next spring.—The City Council have decided to open up a new street to be known as Beverley street. It will be brick paved and sewer, gas and water mains will be put down.

AMHERST, N. S.—Engineer Locke, of the Public Works Department, Ottawa, is making plans and estimates for a large extension to the pier here.—The Town Council have approved of plans submitted by the town engineer for sewerage extension.

WINGHAM, ONT.—The Canadian Bank of Commerce have secured a site on Josephine street and will erect a large building next spring.—J. Wilson will build a brick block.—The town council have decided to issue debentures for \$16,500 for the purchase of a site and erection thereon of a High School.

OWEN SOUND, ONT.—The Grand Trunk Railway have taken an option on the Lymburner property, corner of Frost and Stephen streets, with a view, it is said, to erecting a new station and offices thereon.—The Huron & Ontario Electric Railway Company have applied to the City Council for a franchise to operate a street railway.

NIAGARA FALLS, ONT.—E. D. Pitt, architect, is receiving tenders for the erection of a building for the Peaslee Shoe Company.—J. P. Murray, and A. E. Osler, of Toronto, and others, are seeking incorporation for the Niagara

Frontier Bridge Co., to construct a bridge over the Niagara river from the boundary line between the townships of Stamford and Niagara to a point on the right bank.

SASKATOON, SASK.—Capitalists have been here looking for a site on which to erect a new theatre to cost \$25,000.—The parishioners of Christ's church will erect an edifice to cost \$50,000.—Charles Mitchell, C. E., Niagara Falls, Ont., has been engaged by the town council to report on the feasibility of obtaining power from the Cole Falls.—Gordon & Sparling will erect a large brick building on Eleventh street.

TORONTO, JUNCTION, ONT.—Building permits have been granted as follows: J. Colvin, two and a half-storey brick residence, 70 Keele street south, cost \$2,800; A. McGill, two and a half storey brick and stone residence, 112 Keele street south, cost \$2,500; Wm. Preston, two and a half storey brick and stone residence, 116 Keele street south, cost \$2,500; John Drummer, two two and a half storey brick residences, 78 and 80 Keele street south, cost \$2,900 each.

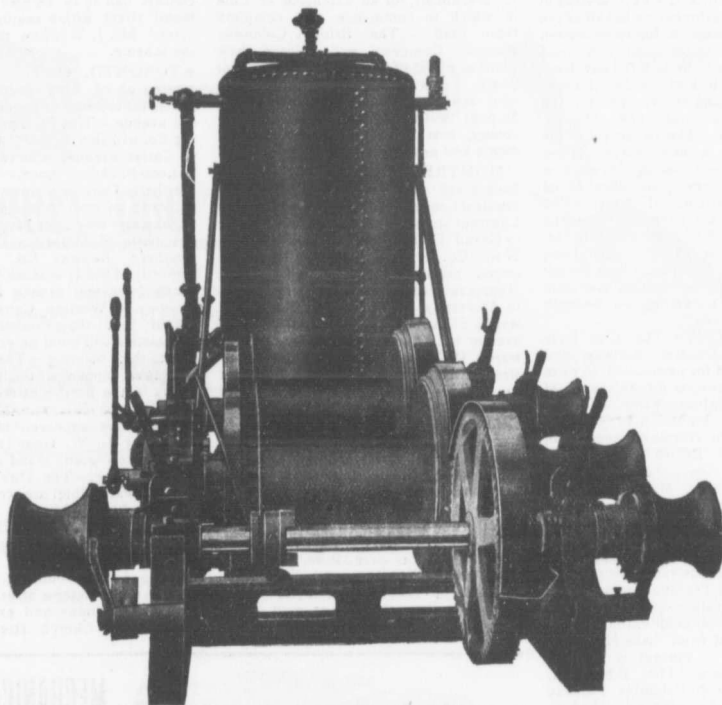
QUEBEC, QUE.—The Committees appointed to report upon the best system of communication between the Quebec bridge and the city will recommend that a line of railway with docks built out into the stream to 55 ft. of water be constructed from the bridge parallel with Champlain street, with a union railway station at Champlain market. The estimate of the improvements along the river front, with the proposed railway terminals, is \$15,000,000.—A building permits has been issued to G. Grenier for a building on Grant street, cost \$3,000.—A new union station will be built here by the different railroads.

VICTORIA, B. C.—Pitcher & Lieser will erect a large building here.—The City Council have approved of the expenditure of \$17,000 to improve Elk Lake.—Tenders will be received up to December 3rd for the erection of a Custom House at Osoyoos, B.C. Plans with W. Henderson, architect, Victoria.—W. R. Wilson, architect, will prepare plans for extensive improvements to be made to the Vernon block.—The Howe Sound Copper Co. intend to install a 600 ton furnace at their smelter at Crofton, B. C.—Hutchison Bros. will erect two large machine shops here.

WINNIPEG, MAN.—The Fairchild Implement Company will erect a seven story building on Princess street. H. B. Rugh, architect, has plans prepared.—J. W. Pulford will erect a three story building on Portage avenue, cost \$35,000.—H. Matthews, architect, has prepared plans for the Meisel Mfg. Company's buildings at Port Arthur, Ont.—The Royal Bank have purchased the premises of the Imperial Dry Goods Co. on Main street, and intend to remodel same.—The T. Eaton Co., Ltd., have acquired property next to their present building and will erect thereon a six story structure.—The building now occupied by the Manitoba Club on Garry street has been purchased by a syndicate and will be remodelled into an office building.

HAMILTON, ONT.—The Provincial Board of Health have approved of the city engineer's plans for the East End sewage scheme.—The Canada Screw Company will erect several new buildings.—The Fire & Water Committee have made application to the city council for \$50,000 for electric pumps for the waterworks and \$30,000 for an East End fire station.—The fire chief has asked for \$100,000 for additions to the fire fighting equipment.—G. L. Glasco, George W. Robinson and John Lennox have decided to erect three large wholesale warehouses and it is also reported

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MONTREAL

that three stories will be added to G. W. Robinson and Co.'s store.—Byers Bros. have taken out a building permit for a brick house on Aikman avenue, to cost \$1,600, and John Stuart will build two brick houses on Stanley avenue to cost \$5,000.—Building permits has been issued to Byrnes & Spence, architects, for a brick house on Cannon street, cost \$2,100.—A by-law will be submitted to the ratepayers at the next election to raise \$120,000 for the sewerage system in the East End and \$75,000 for the erection of an Isolation hospital.

EDMONTON, ALTA.—It is expected that the Warren Co., of Toronto, will receive an order for 80,000 yards of bitulithic pavement and that the Dominion Carbilneum Co., Vancouver, B. C., has an order for 30,000 yards of blocks.—Short, Cross & Biggar will make application at the next session of the Dominion Parliament on behalf of the Athabaska Railway Co. for an extension of time in which to construct their road and for authority to build a railway from For McMurray to Fort Smith.—Debentures will be issued for \$40,500 for the purchase of an incinerator and construction of the plant.—The Bellamy Co. are about to erect a new warehouse on Eighth street.—Local contractors are now figuring on the new post office to be erected on McDougall street.—The Canadian White Co. have taken over the street railway franchise recently relinquished by the Taylor Construction Co.—F. Perkins has taken out a permit to build a dwelling on Victoria avenue to cost \$2,500 and a dwelling on Seventh street to cost \$3,000.

OTTAWA, ONT.—The City have applied to the Ontario Railway and Municipal Board for permission to raise \$50,000 by debentures for extension of the municipal lighting plant.—A company is seeking permission to construct a railway from the Northern boundary of the Province of British Columbia to Dawson City. Henry Blitz and Louis Aurebach, Boston, Mass., are the applicants.—The Klondyke Mines Railway Co. are applying to the Dominion Parliament, through their solicitors, McGivern & Dadon, for an extension of time in which to construct their railway.—The St. Joseph Transportation Co. are seeking incorporation at the present session of the Dominion Parliament to construct a canal from Lake Huron to Lake Erie. J. U. Vincent is solicitor for the applicants.—The Edmonton, Dunvegan & British Columbia Railway Co. are seeking incorporation. They intend to construct a railway from Edmonton, Alta., to Fort George, B. C. Pringle & Guthrie, solicitors, are making the application.—J. B. T. Garon is applying to the Dominion Parliament on behalf of the Crawford Bay & St. Mary's Railway Co. for authority to construct a road from Lethbridge, Alta., to Hartney, Man.

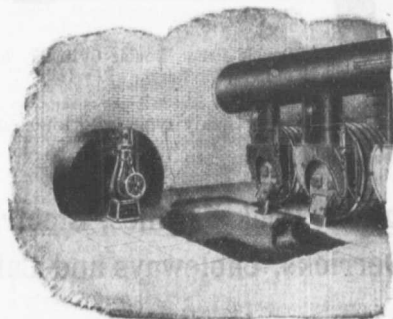
VANCOUVER, B. C.—Building permits have been issued to Teller & Frater for a new lumber mill to be erected at the foot of Laurel street, to cost \$40,000, and to E. B. Deane for a theatre to cost \$60,000.—It is reported that Frye, Bruhn & Co., of Seattle, contemplate

establishing a packing plant in this city.—Plans have reached here from Darling & Pearson, architects, Toronto, for the proposed Canadian Bank of Commerce building to be erected on the corner of Granville and Hastings streets. The exterior of the building will be very striking, having fluted stone columns 40 feet in height and 5 feet in diameter. The estimated cost of the building is \$450,000.—The City Council are considering the advisability of constructing bridges across False Creek at Westminster avenue and Granville street.—Barber & Company will erect a new factory on the south side of False Creek, cost \$4,000.—A gymnasium is to be erected in connection with Columbia College.—The Vancouver & Coast Kootenay Railway Co. are asking the Dominion Government, through their solicitor, D. G. Macdonell, for an extension of time in which to commence and complete their road.—The British Columbia Electric Company will enlarge their plant at a cost of \$250,000.—The school board is asking for \$50,000 to build a new school in East Vancouver, cost \$7,000; a new school in South Vancouver, cost \$7,000, and other improvements and new buildings, \$36,000.

MONTREAL, QUE.—The Council have given notice of their intention to construct sewers in the following streets: Chestnut street, from St. Antoine avenue to Grand Trunk Railway, in St. Henry ward; Cote St. Paul road, from Dagenias street, northwards, in St. Henry ward; Napoleon road, from Notre Dame street to D'Arny street, in St. Cunegeonde ward; St. Antoine street, from Atwater avenue to Brook street, in St. Henry ward; Parthenais street, from Amity street to North city limits, in St. Mary's ward; Gifford street, from Cardinal street to Papineau avenue, in St. Denis ward; Cardinal street, from Gifford street to Laurier avenue, in St. Denis ward; Gowan street, from Comte street to St. Zotique street, in St. Denis ward; Sheppard street, from Amity street to Hochelaga, in St. Mary's ward; Amity street, from Sheppard street to Dufresne street, in St. Mary's ward; Dufresne street, from Lariviere street to Amity street, in St. Mary's ward.—Dymond & Duffield, of London, Ont., have been granted a permit for erection of a new theatre, corner of St. Catharine and City

Councillor streets, cost \$70,000.—The Royal Bank of Canada have purchased property on the southeast corner of Stanley and West St. Catharine streets and intend erecting a bank building thereon.—Smith, Markey & Skinner, are seeking the authority of the Federal Government on behalf of the Athabaska Northern Railway for extension of time in which to construct their road.—Additions will be made to the Sailer's Institute at a cost of \$28,000.—The Point St. Charles Congregational church have acquired property on Wellington street and intend to erect a new edifice.—A site has been purchased at 334 St. James street by the Castle Tea Blend Co., who will in all probability erect a large building.—H. C. Stone, architect, has prepared plans for the erection of three stores on Phillips Place, to cost \$40,000.—A new concert hall is to be erected on Drummond street with a seating capacity of 2,500. Mr. J. W. Shaw is interested in the scheme.

TORONTO, ONT.—Tenders are wanted at 98 King street west for all trades for erection of residence on Pearson avenue.—The Phillips Manufacturing Co. will shortly erect a new factory on Carlaw avenue, to be two stories with 132,000 sq. ft. of floor space.—The Canadian Northern Ontario Railway are seeking authority of the Dominion Parliament to construct nine lines of railway in various parts of Ontario.—The Canadian Northern Railway Co. are seeking authority of the Dominion Parliament to construct several branch lines and extensions in Western Canada.—It is reported that the Confederation Life Association will build an extensive addition to their building.—The City Engineer has recommended the laying of water mains in the north-western part of the city, to cost \$81,775.—The Board of Control have approved of plans submitted by G. W. Gounilock, architect, for the new grand stand and Horticultural building.—The Directors of the King Edward Hotel are considering the erection of two additional stories.—The Argonaut Rowing Club have asked for eight acres of land on Mugg's Landing, Centre Island, on which they propose erecting a club building.—L. Foulds, architect, 43 Victoria street, wants tenders for alterations and extensions to a building on Church street.—Sherman



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Cooper, manufacturer of gasoline engines and boats, has applied to the Board of Control for a block of land on the Don river 200 x 100 ft. on which to erect his factory.—Tenders will be received by the Board of Control up to December 4th for construction of the following sewers: Queen street, from Woodward avenue to 400 ft. east of Coxwell avenue; Shaw place, from Shaw street west 450 ft.; Carling avenue, from Bloor street north 300 ft.—Plans have been submitted by the City Architect, for the new bath-house on the western sand bar to cost \$9,500.—The Canadian Northern Railway proposes to divert the Don river for 1,200 ft., at a cost of about \$300,000.—A new wing will be added to the Parliament Buildings next spring, including a

library building. An appropriation for the work will likely be made at the forthcoming session.—Goutlay, Winter & Leeming are about to erect a factory on Logan avenue.—An English church will be built on Gerrard street east, corner Ashdale avenue. The Rev. Wm. L. Baynes Reid will be rector.

BRANTFORD, ONT.—Buildings for the Brantford Starch Company: Riddells Wright, contractors.

VICTORIA, B.C.—Alterations and additions to Fell and Company's store: Dickson & Howes, successful tenderers.

ST. THOMAS, ONT.—\$16,000 gas

CONTRACTS AWARDED.

LETHBRIDGE, ALTA.—Erection of a skating rink: Thos Stubb, contractor.

ST. JOHN, N.B.—Erection of street railway car sheds: Clark & Adams, successful tenderers.

STRATFORD, ONT.—\$49,000 debentures have been awarded to Wood, Gundy & Co., Toronto.

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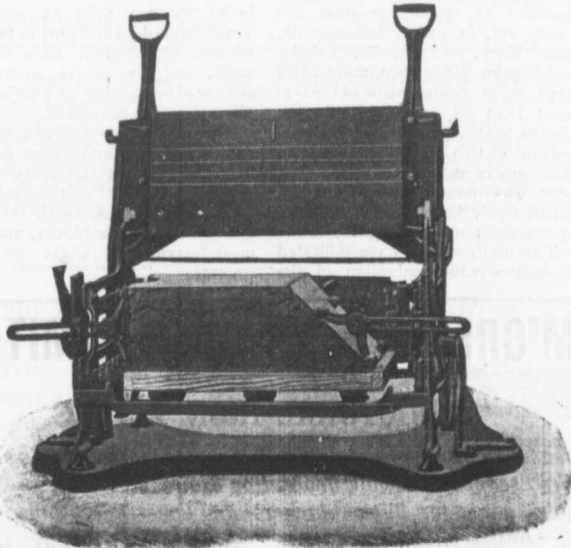
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extension debentures: Wood, Gundy & Co., Toronto, purchasers \$15,880.

VIRDEN, MAN.—Rebuilding of elevator for the Virden Elevator Co.: C. E. Bennel, Brandon, Man., successful tenderer.

TOTTENHAM, ONT.—Heating and ventilating of Christ's church: James Smart Mfg. Co., Brockville, successful tenderers.

VICTORIA, B. C.—Residence on Foul Bay road for Mr. Jameson and residence on South Turner street for F. W. Davey: A. McCrimmon, contractor.

LONDON, ONT.—Heating and ventilating building for the Forest City Paving Company: James Smart Mfg. Co., Brockville, successful tenderers.

WOODSTOCK, ONT.—Erection of barn, stable and driving house for Woodstock Hospital for Epileptics: Nagel & Mills, Ingersoll, Ont., successful tenderers, at \$5,000.

MONTREAL, QUE.—R. M. Rodden, architect, has prepared plans for a new concert hall to be erected on Berthelet street at a cost of \$50,000. A. Reeves is the general contractor.

TORONTO, ONT.—Building of new storehouse at the Rose avenue fire hall: Carpenter work, Dinnis & Son, \$1,493; painting and glazing, F. E. Phillips, \$75; roofing, Rennie & Son, \$487; masonry, E. Gearing, \$2,900.

PORTAGE, LA PRAIRIE, MAN.—Damming, bridging and enlarging of Crescent Lake: V. C. Maddock & Company, successful tenderers.—Erection of a large temporary station for Midland Railway: Kerrick and Company, St. Paul, Minn., contractors.

EDMONTON, ALTA.—Erection of a new Y.M.C.A. building: May, Sharp Construction Company, Edmonton Alta, contractors.—55,000 yards Bitulthic pavement: Warren Bituminous Paving Company, Toronto, Ont., successful tenderers at \$3.25 per square yard; 32,950 square yards Carbolineum block pavement: Dominion Carbolineum Company, Vancouver, B. C. successful tenderers at \$3.65 per square yard.

BIDS.

WINNIPEG, MAN.—The following tenders have been received by the City Council for the superstructure of the Redwood avenue bridge over the Red river: Algoma Steel Bridge Co., \$92,000, with an alternative offer of \$94,550; Ontario Bridge Co., \$97,200; Heenan and Fronda, Manchester, England, \$102,144; Dominion Bridge Co., \$88,800; William Jackson, \$278,000.

HALIFAX, N. S.—The City Works Commission, opened tenders for the erection of a new engine house. They consider the tenders too high and will likely modify the plans in order to reduce the cost. Those submitted were: E. J. Horne, \$23,760; E. Maxwell, \$20,600; M. E. Keefe Co., 19,000; W. Lownds, \$19,500 and S. Marshal & Son, \$18,000.

AN INTERESTING EXPERIMENT IN WOOD PAVING.

Wood has long been used for street pavements. Only within the past few years, however, has it been satisfactorily adopted in the cities of the United States. Previous failures according to a bulletin issued by the United States Department of Agriculture, can be traced almost entirely to improper construction or methods of preparation. In most cases round blocks of cedar or other woods were used, without precautions against decay and without adequate foundation for the pavement. The consequence was that,

as a paving material, wood fell into disfavor.

Recent use of rectangular wooden blocks for street pavements has given excellent results. Many engineers believe that these blocks, when properly creosoted and laid on a concrete foundation, make a pavement which possesses high excellence in a greater number of essential qualities than any other now in use. Among these qualities are great smoothness, low traction resistance, minimum noise, and, considering its smoothness, comparatively little slipperiness. Slipperiness has sometimes proved objectionable, but is not greater for wood than for sheet asphalt, all temperature conditions considered; and wood is much less variable in this particular than is the asphalt. It is probable that no other pavement with equally slight traction resistance will be found less slippery. Wood pavement is also easy to clean and to maintain, and when well laid gives promise of proving more durable than any other except one constructed of the hardest granite.

The cost of creosoted wood pavement is at present comparatively high, averaging about \$3 per square yard, including concrete foundation. In several cities, however, the cost of the pavement has been reduced materially below this figure, and good results have been secured. In Minneapolis, Minn., where the city itself lays the pavement, the total cost per yard is approximately \$2.50. To attempt to cheapen the price, however, at the expense of thoroughness of treatment or careful construction is, with creosoted wood pavement, particularly dangerous economy. Even at the prevailing price, the excellence of this pavement causes many engineers to regard it as the best general-purpose one now in use.

The five cities in which the largest amounts of wood pavement are found are, in order, Indianapolis, New York, Minneapolis, Toledo, and Boston. Together, these cities have more creosoted wood pavement than all other cities in the United States combined. The total amount of this pavement in use in this country at the end of the year 1905 was about 1,400,000 square yards, equivalent to nearly 80 miles of pavement on a street 30 feet wide.

Two main causes have militated against a wider adoption of the

creosoted block pavement. One has been the prejudice which was engendered by the former experience with wood, the other is the rise in price of longleaf or Georgia pine, which is the wood now principally used. The Forest Service of the United States is making investigations to find out what woods are most suitable for use in paving, and whether less expensive woods could not be used to supplement the Georgia pine. The investigations have been upon three lines—to learn the present situation, to make tests of the suitability of various woods, and to lay experimental pavements and note their wear under actual traffic conditions.

An experimental pavement has now been laid in the city of Minneapolis, as a cooperative undertaking between the city government and the Forest Service. Different woods were donated, in lots of 15,000 board feet, by a number of lumber companies or lumber associations interested in extending the market for their respective woods. Creosote and treatment were contributed by two manufacturers of wood pavement.

The woods used were longleaf pine, Norway pine, tamarack, white birch, western larch, and Washington fir. All blocks were laid with the grain vertical, and were 4 inches in depth, 4 inches wide, and from 4 to 10 inches long. These blocks were impregnated with creosote and laid upon a foundation of Portland cement concrete. Successive sections of the pavement were laid in different woods. Also the angles of the courses were varied, one being at right angles to the traffic, another at 45 degrees, and a third between the two, or 67½ degrees.

This experimental pavement was laid on a street which carries the heaviest traffic of the city, so that comparative results can be obtained in as short a time as possible. Traffic records will be made twice a month, on different days of the week, and from these records an accurate knowledge of traffic conditions may be obtained.

This investigation should furnish definite information on the following points: The suitability of the various woods, the relative value of heartwood and sapwood, the best dimensions for the blocks, and the most serviceable angle for the courses.

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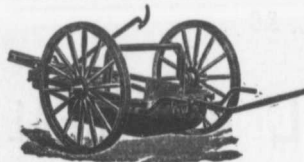
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Notes on the Septic Tank Process of Sewage Purification*

By W. R. BUTLER. M. Can. Soc. C. E.

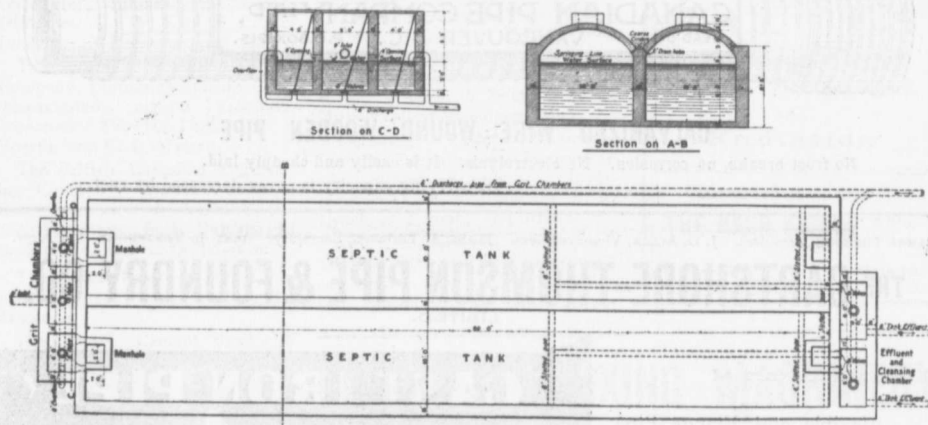
It is but comparatively lately that the biological purification of sewage by the Septic Tank Process has been practically applied under climatic conditions at all similar to those of Canada in the winter season; recent experiences, however, in the colder parts of the European continent, in the Northern United States, and in Canada itself, have dispelled all doubts as to its applicability, and some discussion of this most interesting process, with a few notes on the history of its development, may not at this time be out of place.

The most obscure secrets of biological science may never yield to human enquiry, nevertheless, universally accepted interpretations of many of its phenomena instruct us to recognize, in the performance

the great movements and interchanges of physical energy.

In referring to the important problem of disposal of waste, it would be interesting, if there were space, to enumerate, at length, some of the efforts, with their attendant measures of success, which have been directed, from time to time, towards its solution; for a long period these were, for the most part, of but one character, viz: the removal of putrescent matter to a supposed safe distance, where the processes of decomposition might be completed outside the limits of detection by the ordinary senses. Success, in such cases, turned much upon the density of the population served, its general surroundings, nature of soil, and particular climatic conditions. By degrees,

have been in these ways involved may be illustrated by mentioning that the sludge chemically precipitated from the London sewage for the purpose of mechanical transport is carried to sea in barges at the rate of something like two millions of tons annually; that the city of Chicago has been forced to modify the drainage system of the Great Lakes of America, to provide water carriage of its waste; that the city of Berlin finds it necessary, in its efforts to restore waste products directly to the soil by the processes of agriculture, to cultivate over 19,000 acres, and to spend from \$13 to \$20 for every 1,000,000 gallons of sewage disposed of, besides applying a capital of over \$6,000,000 to a return of only 1% per annum, although the city of Berlin possesses



of a host of apparently simple and natural transformations, incidental to the comforts and necessities of every-day life as well as to its risks and dangers, chapters in the life histories of tiny living organisms which need magnifying perhaps thousands of times to render them visible. Take, for examples, the processes involved in the production of butter and cheese, the making and baking of leavened bread, etc., etc., as also many of the more tragic developments in the courses of human disease.

Now-a-days we recognize this to be eminently true with respect to the transformations which are required in order that the world may be kept sweet and clean, in spite of its constant pollution by the waste products of domestic life, and we are beginning to appreciate the services of myriads of tiny workers whom nature has commissioned to this purpose, and to realize that the existence of life itself upon our earth to-day is as much dependent upon agencies such as these as it is upon

however, the indirect effects of such treatment in the contamination of water supply and in the spread of disease in various other ways, added, in our own times, to a recognition of probable waste in the mis-appropriation of elements required by nature for the completion of her economy, prompted efforts to discover how the unavoidable residues, incidental to application of the products of the soil and atmosphere to the needs of mankind, might be returned to their sources without passage through intermediate stages that were a menace to human wellbeing.

To these efforts are due various classes of expedients, from those of the sewage farm to the chemical and mechanical processes of purification, which latter generally aim either at rapid transformations, by artificially bridging over steps in the natural process, or merely at the production of a material ease of mechanical transportation, with, in some cases, a further laudable effort to make economic use of the substances produced.

The gigantic operations which

exceptional facilities for carrying out such a process cheaply.

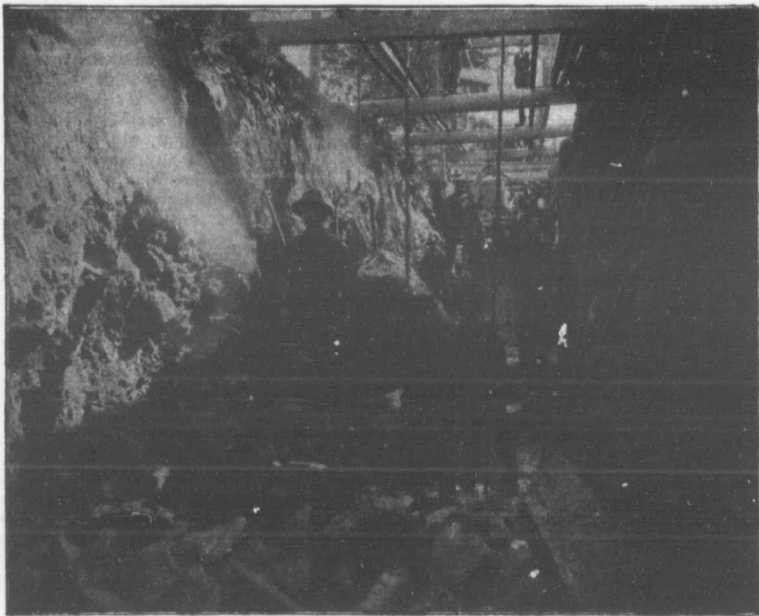
The immediate and essential object of the sewage farm and, in general, of the various chemical or mechanical processes of purification, is the production of a final effluent which may be discharged without danger into some stream or convenient body of water.

The degree of purification, as measured by the character of this final effluent, may rise to 90% in the case of the sewage farm, but it is evident that treatment in this way is in many cases quite impossible, both on account of climate and of the land area required.

With the various "short cuts" of chemical and mechanical purification, the effluents arising from different processes show a removal of from 30% to 90% of putrescible organic matter, accomplished, in most cases, by proportionate expense quite comparable with that quoted above; the process always being accompanied by that most troublesome of incidentals—the necessary removal of the solid residue, or the "Sewage Sludge." It must

*Paper read before the Canadian Society of Civil Engineers.

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be said also that, despite all theory to the contrary, it has, so far, been found absolutely impossible to so treat domestic sewage as to make the process pecuniarily remunerative.

As already stated, the percentage of purification, as shown by chemical or biological analyses, is generally taken as a measure of the degree of safety with which the effluent produced may be discharged into a stream of running water, and finally disposed of so far as the producers are concerned; but it is very necessary to bear in mind, in connection with this matter, that mere diminution in germ life and cessation of biological activity are of themselves insufficient evidence of permanent gain in purity; for the latter turns entirely upon the history of the process and the nature of the causes which may have led to an apparently satisfactory biological condition of any such effluent.

A mere sterilizing process, by means of antiseptics, may produce an effluent showing, in itself, marked freedom from germ life, which, nevertheless, when the antiseptic ingredients have become diluted by admixture with sufficient quantities of pure water, may permit a development of bacterial life, and a putrefactive condition which will sometimes compare unfavorably even with that of the original sewage.

A perhaps unjust and sweeping denunciation of most methods of chemical and mechanical sewage purification, as carried out 40 years ago, was pronounced by an English commission, appointed at the time to enquire into their efficacy, when it was declared that "As applied to sewage, disinfectants do not disinfect, and filter beds do not filter."

This last clause leads one to speak of the place of the sewage filter in connection with these matters. The passage of a fluid through a porous medium, for the purpose of purification by mechanical straining, is probably as old as mankind; it would be taught by a very superficial observation of nature. The Egyptian woman who fills her porous earthenware pitcher with comparatively clear water, by allowing the turbid waters of the Nile to filter through it is, no doubt, continuing a custom of the highest antiquity, but it is very lately, indeed, that anything has been recognized in the purifying action of a granular or porous filtering medium beyond a mere mechanical straining.

One of the earliest hints, to the general reader, of a recognition of anything more than this, appeared in the Encyclopædia Britannica not 25 years ago, when, in an article on the action of filtering media, the following fact was mentioned as but recently observed, viz: That the diminishing efficiency in the purifying action of a filter, arising from

continuous uninterrupted use, might very frequently be quite arrested by simple rest and aeration of the filter. We have since learnt that the reason for this is a remarkable biological fact, and it is a part of the intention of this paper to refer very briefly to some highly important consequences of its discovery, with that of certain co-ordinate principles.

Purification of sewage, to be satisfactory, must involve the entire breaking-up and oxidizing of organic compounds and putrescible matter present, and their complete transformation into either harmless elements or stable compounds without any of the offensive and injurious consequences which attend the natural processes of ordinary spontaneous (and generally slow and imperfect), putrefactive decomposition. Now, it has been clearly shown that mere contact with the oxygen of the air is quite inadequate to effect this, and that the passage of sterilized air through sewage, produces no change in the oxidizable organic matter contained, and moreover, that subsequent decomposition of sewage, which has itself been sterilized, is invariably accompanied by offensive putrefaction.

Most of us know by experience that in the processes of agriculture and in the effects of soils and vegetation upon putrescible matter, the offensive accompaniments of decomposition are largely absent. A most important announcement, tending towards an explanation of this, was made in 1877 by Mr. R. Warrington, based upon investigations which he had been carrying on at Rothamstead in England, and Mr. Warrington was able conclusively to demonstrate that "the oxidizing and breaking up of organic compounds present in the soil, without what is commonly known as putrefaction, could never be accomplished by mere contact with air present in the soil (as had been supposed), but were entirely dependent upon the life processes of minute living organisms.

Since that time an immense deal of effort has been directed by individuals and by scientific associations towards the bearing of this principle upon methods of sewage purification, and through the investigations of such as Mr. Dibden, Chief Chemist to the London County Council, members of the Massachusetts State Board of Health, Mr. Scott Moncrieff, and many others the world over, the fact has gradually been realized that "all sewage purification processes, to be successful, must be subordinated to the requirements of micro-organisms, by whose agency alone such purification can be completed."

This being the case, it becomes evident how directly opposed to Nature's law is any process, the

essential features of which are attempts at a sterilization which would suspend, if not destroy, the agencies commissioned by nature to the work in hand.

Quite early in these investigations it was noticed that in the breaking-up of organic compounds by certain classes of bacteria, which need the constituents for their development and sustenance, the decomposition was accompanied by a process of liquefaction, and it was later on asserted by Mr. Scott Moncrieff that, on account of this, biological purification of sewage was fully possible without the previous removal of organic matter in suspension, and that a process properly carried out on this principle need not involve the tremendous difficulty and expense attendant upon the dealing with sewage sludge, a difficulty inseparable from any chemical or precipitation method of treatment.

It is found, moreover, that crude sewage invariably contains the germs of living organisms, to the development and life of which certain of the constituents of the decomposable matter present are a necessity. The activities of these organisms vary greatly with changes in environment, and Mr. Scott Moncrieff was probably the first to announce that the purification of sewage which went on under biological action consisted of two distinct consecutive stages, during which the operations of the bacteria upon decomposable matter were exactly opposite in character—the process being "Anaerobic" during the first stage, and in the second stage, "Aerobic."

In the first, the micro-organism obtained for its nourishment and development its necessary supply of oxygen by the process of the breaking down of organic compounds, and of abstracting the necessary oxygen from these compounds themselves; hence, this process is possible out of contact with air; its results are accompanied by liquefaction of solids and a reduction in the complexity of the organic matter in solution.

This process will continue so long as a supply of oxygen is in this way available in the body of sewage and is available from no other source.

Upon the exhaustion of this internal oxygen supply the further life process of the micro-organism can only be carried on in the presence of air; but in its presence an oxidation and nitrification of albuminous and ammonia compounds in solution ensues as a direct consequence again of biological activity, which, under the latter condition, is accordingly termed "Aerobic." Moreover, it has been shown that the decomposition which takes place during both these stages will

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be fermentative or putrefactive,* according, in a great measure, to the time allotted to each process respectively.

Without a minute discussion of the complex character of ordinary sewage, we may notice that the organic matter which it contains consists usually of an immense variety of highly complex compounds, largely nitrogenous or hydrocarbon, the decomposition of which, by the abstraction of oxygen, will naturally lead to nitrogenous compounds of simpler chemical composition, together with such stable products as water, ammonia, carbonic acid gas, marsh gas, free hydrogen, and free nitrogen.

Ammonia in solution in a liquid produced by natural causes would be taken as probable evidence of previous decomposition of organic matter; albuminoid ammonia, as indicating a danger of further putrefactive decomposition. The more stable products mentioned above, so far as danger of the latter is concerned, may be considered harmless. If a sufficient further oxidation of the ammonia compounds can be effected to convert the ammonia into nitric acid, the danger of putrefaction is averted; the net result will be that gases which have been liberated will have been returned to the air; the remaining nitrogen will experience nitrification and, in this beneficial form, will return to the earth with the liquid in which it is present in solution: so that the journey begun by the constituents originally present in soil and air, for the beneficial purpose of ministering to the needs of vegetable and animal life, ends in the return of these constituents to their original sources.

Now it has been ascertained that such changes as these, and in the order given, are precisely those effected by the instrumentality of the minute organisms to which we have referred; that these changes will infallibly be effected by them if only suitable conditions are provided for their activities, and moreover, that the micro-organisms themselves, required to effect these changes, are invariably found to be present in sewage in a crude state.

The importance of these facts cannot be over-estimated; their discovery bears distinct analogy to the recognition in medicine of the principle of the "Vis medicatrix naturae," which may, perhaps, be said to have revolutionized modern therapeutics.

Nine years ago the first efforts to provide the conditions essential to

*Decomposition (other than that due to slow natural decay), is divided by Liebig into two classes, "Fermentative" and "Putrefactive"; the products of the latter are unstable, and are generally nitrogenous compounds capable of again entering amongst themselves into more or less complex further combination. Putrefactive decomposition is usually accompanied by offensive odour. Fermentative decomposition, on the other hand, gives rise to products stable in character, and it is, generally speaking, unaccompanied by offensive odours. The first is an inseparable accompaniment to the decomposition of nitrogenous organic matter.

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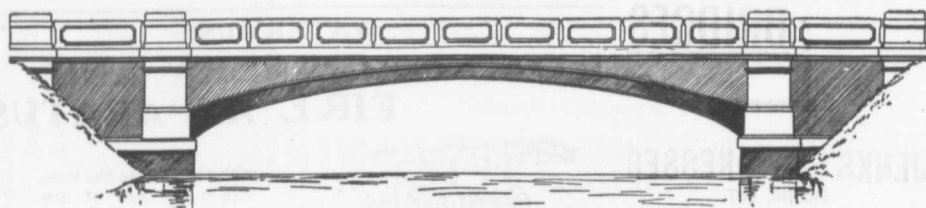
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biological processes, such as we have described, upon a scale applicable to domestic sewage purification, were begun by Mr. Donald Cameron, the City Engineer of Exeter, England. Mr. Cameron's work and its results are now historic.

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(To be continued in next issue.)

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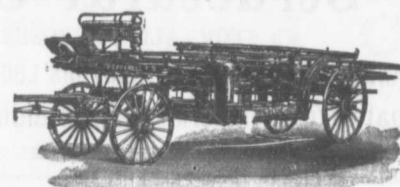
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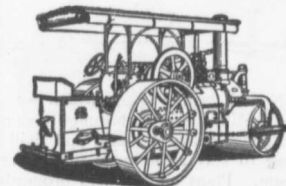
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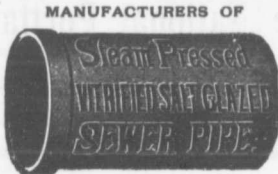
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Mr. Lachlan Kennedy died at the

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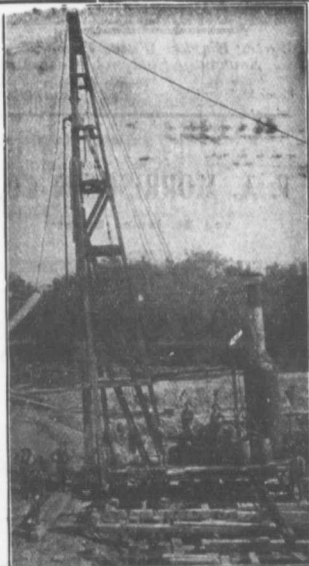
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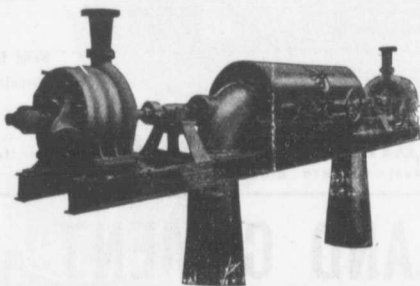
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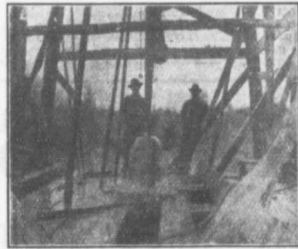
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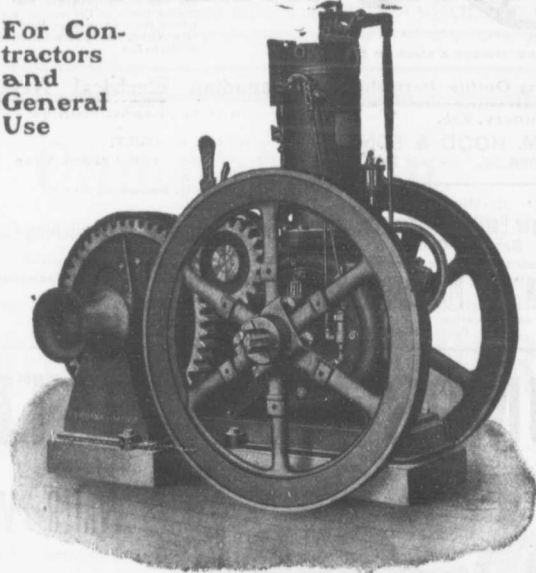
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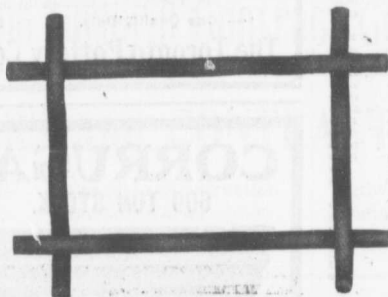
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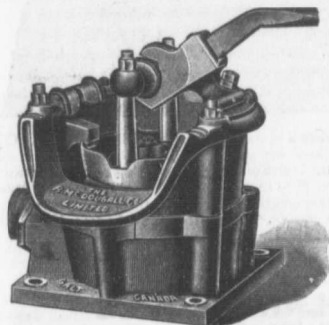


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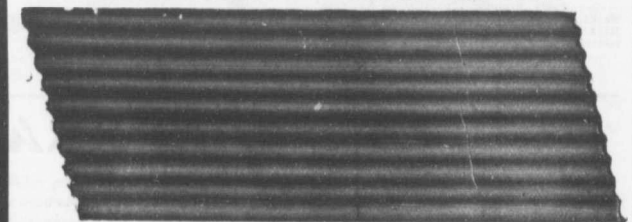
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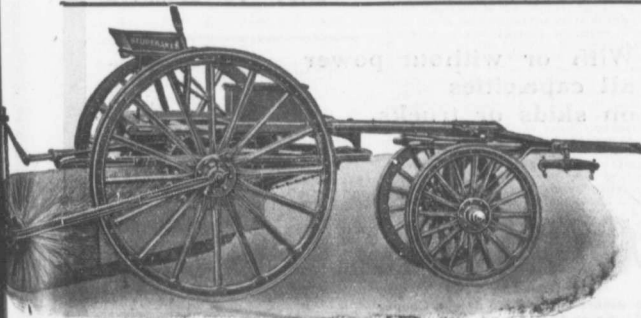
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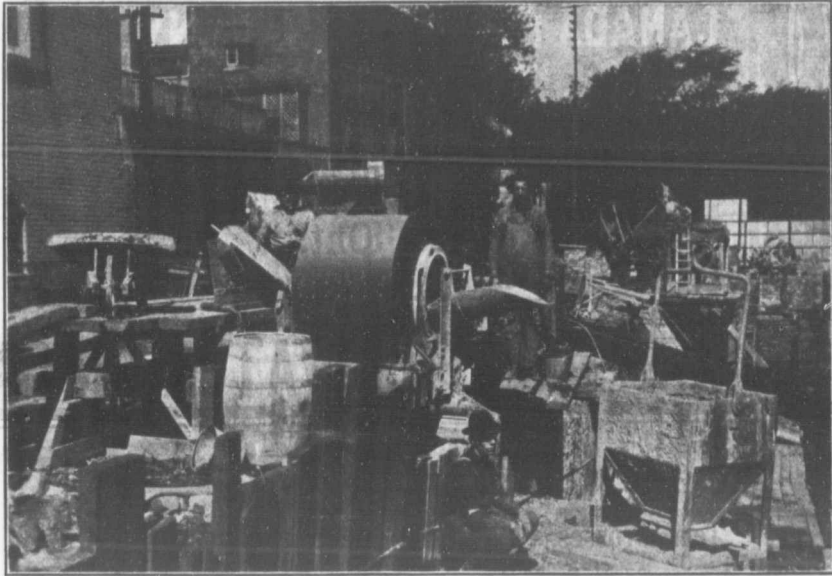


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