

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.

VOL. 17.

TORONTO, MONTREAL — DECEMBER 5, 1906 — WINNIPEG, VANCOUVER

No. 40

THE CANADIAN CONTRACT RECORD PUBLISHED EVERY WEDNESDAY

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THE C. H. MORTIMER PUBLISHING COMPANY of Toronto, Limited.

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WANTED

Capable man who understands sewer construction to represent us in Canada. Information given on application.
BLAW COLLAPSIBLE STEEL CENTERING CO.,
717 Westinghouse Building, Pittsburg.

Tenders for Debentures

VILLAGE OF ACTON

Tenders will be received by the undersigned for the purchase of \$974.36, twenty-year, four per cent. Permanent Pavement Debentures of the Village of Acton, up to SATURDAY, 8TH DECEMBER.
The highest or any tender not necessarily accepted. All particulars given upon application to

THOS. T. MOORE,
Municipal Clerk, Acton, Ont.

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.

CLERK OF WORKS

seeks engagement, thoroughly experienced in all branches of public and private work, good references. J. GREENWOOD, 4 Briggs Avenue, Toronto.

TENDERS FOR CITY SUPPLIES

Sealed tenders for 1907 supplies for the City of Calgary, Alberta, will be received by H. E. Gillis, City Clerk, until the 31ST OF DECEMBER, 1906, for the following materials:

CEMENT,
LE D PIPE,
CORPORATION COCKS,
CAST IRON WATER PIPE,
SEWER PIPE.

Specifications may be obtained from the City Engineer. The lowest or any tender not necessarily accepted.

R. H. SPRAKMAN,
City Engineer.

FOR SALE

Canadian patent rights, covering patent collapsible steel center for concrete culvert and other viaduct construction. Information given on application.

BLAW COLLAPSIBLE STEEL CENTERING CO.,
717 Westinghouse Bldg., Pittsburg Pa.

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 28TH, 1906. Fuller particulars regarding requirements will be furnished on application to

G. A. MILLER,
Secretary.



Builders and Contractors

TENDERS FOR NEW GRAND STAND AND HORTICULTURAL BUILDING

Bulk tenders addressed to the undersigned will be received through registered post only, up to noon on

MONDAY, DECEMBER 17TH, 1906,

for the various works required in the erection and completion of a grand stand, also of a horticultural building, on the Exhibition Grounds, Toronto.

Plans and specifications may be seen, and all information, together with forms of tender, obtained at the office of Mr. George W. Gouinlock, architect, Temple Building, Toronto.

Tenders must be accompanied by a marked cheque, payable to the order of the City Treasurer, or a cash deposit, equal to 5 per cent. on tenders up to \$1,000, and 2½ per cent. on tenders over that amount.

Should any party whose tender is accepted fail to execute the necessary contract and bond and give satisfactory security for the due fulfillment of the contract, the deposit accompanying the tender will be forfeited to the city.

A penalty sufficient to insure the full completion of the work on or before the 10th day of August, 1907, will be exacted.

The lowest or any tender not necessarily accepted. The deposits of unsuccessful tenders will be returned.

EMERSON COATSWORTH, Mayor,
Chairman Board of Control.
City Hall, Toronto, November 30th, 1906.

Mr. Alfred Jackson, president of the Jackson Building Company, Winnipeg, Man., will be a candidate for Alderman in Ward 4.

Mr. D. J. Stone, clerk and treasurer of the Township of Pelham, died very suddenly on November 27th.



INTERCOLONIAL RAILWAY

NOTICE TO CONTRACTORS

Sealed tenders addressed to the undersigned and endorsed "Tender for Shops," will be received at this office until 16 o'clock on MONDAY, THE 10TH DECEMBER, 1906, for the construction and erection of Locomotive Shops in the yard of the Intercolonial Railway at Moncton, New Brunswick.

Plans and specifications of the works can be seen on and after this date at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa; at the office of the General Manager of Government Railways, Moncton, N. B., and at the office of the superintending Engineer of the Canals of the Province of Quebec, No. 2 Place d'Armes, Montreal, at which places forms of tender may be obtained.

In the case of firms there must be attached the actual signatures of the full name, the nature of the occupation and place of residence of each member of the same, and further, an accepted bank cheque for the sum of \$30,000 must accompany the tender; this accepted cheque must be endorsed over to the Minister of Railways and Canals, and will be forfeited if the party tendering declines entering into contract on the terms stated in the offer submitted.

The accepted cheques thus sent in will be returned to the respective parties whose tenders are not accepted.

This Department does not, however, bind itself to accept the lowest or any tender.

By order,

L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 9th November, 1906.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

CONTRACTS OPEN.

MOUNT FOREST, ONT.—Cement sidewalks will be constructed here at a cost of \$1,771.

REGINA, SASK.—Authorities are looking for a site on which to erect a Y. M. C. A. building.

EGLINTON, ONT.—It is reported that the Methodist congregation will erect a new church.

GRANBY, QUE.—Arthur Wallace has purchased property here and will erect a tenement house.

MILLBROOK, ONT.—It is probable that a gas lighting system will be installed in the near future.

TREHERNE, MAN.—The ratepayers will vote on a by-law to establish a municipal telephone system.

BARRIE, ONT.—A by-law to loan the Dymont Foundry Co. \$12,000 has been defeated by the ratepayers.

NICOLA, B. C.—The Provincial Government will construct a bridge across the river at a cost of \$2,500.

RAINY RIVER, ONT.—The Council are considering the question of extending the sewerage and waterworks system.

BRANTFORD, ONT.—The Y.M.C.A. authorities are considering the erection of a new building at a cost of \$30,000.

BELLEVEILLE, ONT.—Plans for the new Isolation hospital have been approved of by the Provincial Board of Health.

BATTLEFORD, SASK.—A site opposite the post office has been purchased on which to erect a hotel to cost \$30,000.

MEAFORD, ONT.—Plans have been prepared for a church to be erected for the Methodist congregation, to cost \$18,000.

PARRY SOUND, ONT.—The Canadian Pacific Railway will construct a bridge over the Seguin river, at a cost of \$300,000.

PINKA, MAN.—A public meeting held here recently was unanimously in favor of installing a municipal telephone system.

THORNBURY, ONT.—A by-law will be submitted to the ratepayers for authority to expend \$5,000 for cement pavements.

PRESCOTT, ONT.—The Dominion Central Railway Co. are asking for an extension of time in which to complete their lines.

MOUNT PLEASANT, N. B.—T. H. Estabrooks has purchased property here and will erect a brick and stone residence.

KAMLOOPS, B. C.—J. J. Carment, City Clerk, is taking new tenders up to December 6th for the construction of a septic tank.

BOISSEVAIN, MAN.—The ratepayers are considering the installation of a waterworks and sewerage system at a cost of \$115,000.

CHATHAM, ONT.—The City Council have decided not to erect the proposed new pumping station until the Niagara power question is settled.

WATERLOO, QUE.—The Protestant School Commissioners are taking tenders for a new school building to be erected here next spring.

ST. CATHARINES, ONT.—St. Catharines General & Marine Hospital Association are considering the question of building a new hospital.

EXSHAW, ALTA.—English capitalists will erect a large cement works here. George Middleton, of Winnipeg, is representing the company.

SEAFORTH, ONT.—Tenders will be received up to December 13th by J. A. Wilson, Town Clerk, for the purchase of \$56,500 debentures.

WATERDOWN, ONT.—The Grand Trunk Railway have decided to erect a subway here in conjunction with the County of Wentworth.

ACTON, ONT.—Tenders will be received up to December 8th, by T. T. Moore, Town Clerk, for the purchase of \$3,954.54 pavement debentures.

ALVINSTON, ONT.—A by-law to grant a loan of \$3,000 for the establishment for a basket and wooden-ware factory here, has been defeated.

GODERICH, ONT.—It is understood that the Kensington Furniture Company will ask the town for a loan of \$25,000 with which to extend their factory.

COLLINGWOOD, ONT.—The Board of Education will ask the City Council for \$18,000 with which to erect an eight-roomed school building.

ST. BONIFACE, MAN.—G. A. Rocan, Town Secretary-Treasurer, will receive tenders up to December 20th for the purchase of \$100,000 debentures.

GORRIE, ONT.—The Township Council of Howick will probably issue debentures for \$30,000 for cement culverts, cement abutments and steel bridges.

DOMINION, N. S.—The Town Council are considering the question of obtaining a water supply and electric light service from the town of Glace Bay, N. S.

POINTE-AU-PIC, QUE.—Joseph Warcen will build a brick residence here to cost \$10,000. Plans prepared by Ouellet & Levesque, architects, Quebec, Que.

DESERONTO, ONT.—The ratepayers will be asked for authority to loan the Deseronto Furniture Company \$10,000 with which to erect a four storey factory.

PEMBROKE, ONT.—The Council of the United Counties of Stormont, Dundas and Glenarry are having plans prepared for a House of Industry, to cost \$20,000.

ST. MARY'S, ONT.—The St. Marys & Western Ontario Railway Company are making application to the Dominion Parliament for extension of time in which to construct their road.

HALIFAX, N. S.—The Liverpool & Milton Railway Company, Ltd., have taken tenders for grading, relaying and ballasting the tracks for the Milton & Liverpool Railway Company.

OWEN SOUND, ONT.—The Owen Sound Bridge & Terminal Co., who are seeking incorporation from the Dominion Government, will construct a bridge over Owen Sound bay.

PRINCE RUPERT, B. C.—N. S. Hoffer, architect, Vancouver, will prepare plans for the erection of several large warehouses, a school, two churches and a number of large dwellings here.

HAMPTON, N. B.—G. W. Vaughan, of this village, W. E. Foster, of St. John, N. B., and others, are seeking incorporation as the St. Martis Railway Co., the authorized capital being \$99,000.

HALIFAX, N. S.—The City Engineer is investigating the possibilities of operating a garbage cremating plant as a fuel feeder for an electric lighting station, also the cost of constructing a septic tank.

CORNWALL, ONT.—The Council of the County of Cornwall will borrow \$10,000 with which to complete the River Aux Raisin drain, as recommended by W. B. Smellie, C. E., Brockville, Ont.

PETROLIA, ONT.—Tenders will be received by J. W. McDougall up to December 8th for the repair of the Thompson drain; and by F.D. McDonald

up to same date for repair of the McCrie drain.

BERLIN, ONT.—The C. H. Westwood Company, Toronto, have amalgamated with the J.B. Gatemans Company, and will erect a new building on Cedar street to replace the one recently burned.

ANDOVER, N. B.—Application will be made to the Provincial Parliament for a charter, by the St. John & Grand Falls Electric Railway Co. with power to construct a line from St. John to Fredericton.

DESCHENES, QUE.—The Canadian Pacific Railway have purchased the power plant of the Capital Power Company and it is probable will convert the Pontiac and Pacific Junction Railway to electric traction.

CALGARY, ALTA.—C. P. Taprel has purchased the Alberta Hotel and will erect a large addition to same.—The Majestic Wire Fencing Co., Detroit, Mich., will erect a branch here at a cost of \$40,000.

FREDERICTON, N. B.—Tenders will be received by the Department of Public Works up to December 10th for the rebuilding of the Riley Brook bridge, Victoria county, and the Colson bridge, Carleton county.

AMHERSTBURG, ONT.—The ratepayers will be asked for permission to grant concessions to the Canadian Tanners, Limited, in return for which the company agree to erect a two-storey building 40 x 100 ft.

FORT FRANCES, ONT.—The Town Engineer has been instructed to prepare plans and call for tenders for a septic tank. The Town Engineer is asking for quotations on a steam boiler 14 x 60 inches and suitable stack for same.

LONDON, ONT.—The Board of Works has recommended that a by-law be submitted to the ratepayers for permission to extend the sewerage system, at a cost of \$50,000.—Smallman & Ingram will build a five-storey block on Dundas street.

WOODSTOCK, ONT.—The County of Oxford is endeavoring to have its by-laws changed in order that it may obtain a share of the good roads fund instituted by the Ontario Government. If the grant is received, about 200 miles of road will be improved.

SASKATOON, SASK.—The Bank of Montreal have purchased land here and intend to erect a building next spring.—Wilson Bros. are about to erect a brick building.—The Hospital Board have accepted the plans of W. W. LaChance for the new hospital.

QUEBEC, QUE.—It is reported that a new theatre will be built here. John E. Turton is interested.—The Quebec & Island of Orleans Railway Co. will apply to the provincial Government for a charter with power to construct a line from Quebec to St. Francois.

PORT ARTHUR, ONT.—The Port Arthur Chronicle has purchased a large site and will erect a three-storey building.—Tenders will be received up to December 31st for all trades required in the erection of a frame dwelling. Plans with A. Clavet, Cumberland street.

HAMILTON, ONT.—The ratepayers will be asked to authorize the expenditure of \$30,000 for the erection of a Home for Incurables and \$75,000 for an Isolation hospital.—It is reported that the Phillip Carey Mfg. Co. have purchased land here and will erect a branch factory.

BRANDON, MAN.—M. O. Hedley, representing an English cordage company, has acquired a site here and will erect a branch warehouse.—The Brandon Y. M. C. A. have purchased land at Cornelias Point and intend to erect cottages and a large dining hall.

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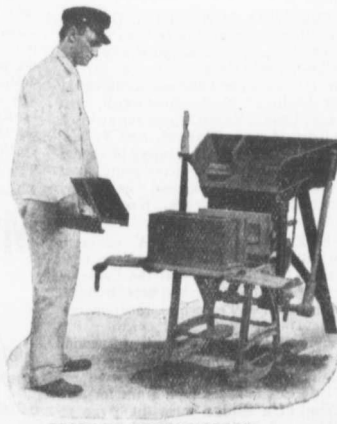


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VICTORIA, B. C.—The Merchants and the Northern Banks have purchased lots on Yates street on which they intend to erect buildings.—The Majestic Wire Fencing Co., Detroit, Mich., will erect a factory here for the manufacture of concrete reinforcements, to cost over \$40,000.

EDMONTON, ALTA. — Tilden-Gurney Co., of Hamilton, Ont., will erect a large warehouse here.—Tenders will be received up to December 15th by John Stocks, Deputy Minister of Public Works, for plumbing, heating and ventilating of the Normal school building at Calgary, Alta.

GUELPH, ONT.—It is understood that an addition will be made to the Guelph Agricultural College, to cost \$15,000.—The Board of Health have recommended the erection of a consumptive hospital.—The Guelph Glazing Co. have acquired the factory which was recently occupied by Carter & Co. and will remodel same.

NEW WESTMINSTER, B. C.—A site has been acquired on which a gymnasium will be erected.—A. Hardman has purchased a site at the corner of Victoria and McKenzie streets and will erect a block thereon.—The Crystal Glass Co. have purchased the building of the Automatic Can Co. and will make alterations at once.

SELKIRK, MAN.—Tenders are being taken up to December 6th by Thomas Partington, Town Secretary-Treasurer, for excavating, laying of water mains, supplying vitrified sewer pipe, and constructing concrete sewers, manholes, and catch basins.—A by-law will shortly be submitted in the question of installing a municipal telephone system.

PRINCE ALBERT, SASK.—George Dangerfield has purchased a site here for a new hotel to cost \$40,000.—Charles Stacey has purchased the Royal Hotel. He will make some alterations at once and intends to erect a more modern structure on the property next spring.—It is reported that brick blocks will be erected here next spring by G. W. Baker, Andrew Stewart, S. McLeod and Mrs. Bowler.

SASKATOON, SASK.—A large warehouse is to be erected here next year for the use of the Manson, Campbell Company and Chatham Carriage Works, both of Chatham, Ont.—The Town Council are considering the establishment of an incinerator plant, in which case debentures for \$25,000 will be issued.—The Bank of Montreal have purchased a site corner Twenty-second street and Second Ave., on which they propose erecting a building.

TORONTO JUNCTION, ONT.—The following permits have been issued: John Colvin, two and a half storey brick dwelling, Keele street south, cost \$2,800; John Drummer, two one and a half storey brick dwellings, Keele street south, cost \$5,200; Joseph Edwards, two storey brick dwelling, Uxbridge avenue, cost \$1,800; A. McGill, two and a half storey brick and stone residence, Keele street south, cost \$2,500; W. Preston, two and a half storey brick and stone residence, Keele street south, cost \$2,500.

PETERBORO, ONT.—A concrete dam will be built at Lovesick Lake next spring.—It is reported that the Crossley Carpet Co. will establish a branch here.—The Board of Trade have recommended that the City Council consider the question of installing a filtration system.—Deputations from the townships of Drummer and Douro recently waited on the City Council seeking a grant for the building of a bridge over the river at Warsaw.—A by-law will be submitted to the ratepayers to provide money for making permanent the bridges on Brock,

Reid, Kean and Dalhousie streets, and also for the construction of the trunk sewer from Smith to Dover streets.

VANCOUVER, B. C.—A bridge is to be constructed across the Squamish river by the Provincial Government to cost \$7000.

—T. K. Shand, architect, has prepared plans for an eight-storey and basement reinforced concrete block to be erected on Hastings street, between Westminster and Gore avenues. The building will be occupied by a departmental store, the promoters of which are Vancouver and St. Paul capitalists. The details of the building are at present withheld.—Cavanaugh & Holden have prepared plans for a three-storey block on Westminster avenue.—L. H. Cohn, representing a local syndicate, has had plans prepared for a roller skating rink on Pender street, cost \$40,000.—The Burrard-Westminster Boundary Railway & Navigation Co. are seeking incorporation with power to construct several lines in British Columbia.—By-laws have been passed authorizing the expenditure of \$60,000 for a public market and \$40,000 for an incinerator.—It is reported that the Canadian Pacific Railway will erect a new station.

OTTAWA, ONT.—Tenders will be received by F. Gourdeau, Deputy Minister of Marine and Fisheries, up to December 10th, for steel plates and shapes required for the construction of a dipper dredge. Specifications at the offices of the above department, their agents at Montreal, or G. J. Desbarats, Director of the Government ship yard, Sorel Que.—Tenders will be received by F. Gelinus, Department of Public Works, up to December 17th for construction of landing piers at Lambton and Coleraine in Lake St. Francis, Que. Plans with J. L. Michaud, engineer, Merchants Bank Bldg., Montreal, and Postmaster at Lambton, Que.—The Quinze & Blanche River Railway Co. are seeking incorporation from the Dominion Parliament to construct a road from a point in the township of Dymond to Quinze Lake, Que.; Perkins, Fraser & Gibson, Ottawa, Ont., solicitors for the applicants.—The Midway & Vernon Railway Co. are applying to the Dominion Parliament for an extension of time in which to complete their road.—The City Engineer has estimated the cost of a municipal paving plant at \$16,000.—The Civic Electric Commission will submit a by-law to the ratepayers for authority to borrow \$500,000 for the purchase and development of a power plant.—F. R. Heakes, provincial architect, is about to prepare plans for alterations to the Normal school building in this city.

WINNIPEG, MAN.—The ratepayers will be asked to vote on the question of installing a municipal telephone system.—J. H. Agnew, Provincial Treasurer, will receive tenders up to December 20th, for the purchase of \$274,000 drainage debentures.—The Board of Works have recommended that tenders be called for the following improvements: Sewers, Quelch street, from Logan to Irish avenues, cost \$2,515; Alfred avenue, from

McGregor to McKenzie streets, cost \$1,367; Catharine avenue, from Quelch street to C. P. R. tracks, cost \$1,786; Steward, Bird Hills road and Poplar avenue, from Red River to Montcalm street, cost \$72,000; cedar block pavement on a lane north of Portage avenue, from Hargrave to Edmonton streets, cost \$1,786.—The Board of Works have recommended the following improvements: Asphalt pavements; Dromore street, from Harrow to Cambridge streets, cost \$13,303; Ethel avenue, from Harrow to Cambridge streets, cost \$15,125; Harrow St. from Wardlaw avenue to Wellington crescent, cost \$20,395; Sewer in Eccles street, from Florence to Morley avenue, cost \$4,880.—The Northwest Fire Underwriters' Association have written the City Council recommending the following improvements: The purchase of a 5 million gallon centrifugal pump with separate motor; the laying of several mains, the removal of all electrical machinery from the pump house, and the building of four additional fire tanks.—H. B. Kugh, architect, will receive tenders up to December 3rd for erection and completion of a warehouse for the Fairchilds Company, Limited.—C. J. Brown, City Clerk, will receive tenders up to December 31st for water pipe, specials of various sizes, gates and hydrants for extension of the high pressure system.—The City Engineer has recommended the purchase of new asphalt plant, estimated cost \$25,000.

MONTREAL, QUE.—The Water Committee have recommended the expenditure of \$2,000,000 to extend the waterworks system.—The Roman Catholic School Board have been notified to erect fire escapes on all their buildings.—Tenders will be received by L. O. David, City Clerk, up to December 7th for license and vehicle numbers, badges, etc.—The Manitoba & Northwestern Railway Co. are applying to the Dominion Government for authority to construct a branch line from Theodore, Sask., to a junction with the Quills Lake branch.—G. Fraser, representing several capitalists, is considering the erection of a car wheel plant at Longue Pointe.—It is reported that the Knox church and Y. M. C. A. property is about to be sold to a concern who intend to erect a large hotel.—The following permits were issued last week: O. & F. Proulx, 12 dwellings, Gifford, cost \$8,400; B. Bayte, 2 dwellings, St. Andre, cost \$2,000; B. Forget, 6 dwellings, Gan, cost \$6,000; N. Racine, three dwellings, Moreau, cost \$3,400; N. Vechar, three dwellings, Moreau, cost \$3,400; J. Lebourneau, two dwellings, Chambord, cost \$1,800; Dr. Bernier, two dwellings, Ontario east, cost \$4,000; J. O. Gagnon, eight dwellings, Aylwin, cost \$5,000; A. Gregoire, two dwellings, St. Hubert, cost \$2,000; Benoit & Fils, three dwellings, St. Hubert, cost \$6,500 and L. Lamoureux, four dwellings, Darion, cost \$3,000.—The Calgary & Edmonton Railway Co. are applying to the Dominion Parliament for authority to construct a branch line in Alberta.—The Manitoba & Northwestern Railway Co. are applying to the Dominion Government for

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ESTIMATES FURNISHED

authority to construct a branch line from Breckenbury to a point near Kamsack.—The Canadian Pacific Railway will not proceed with the extension of the Windsor street station for some time. Plans have been prepared for a larger structure to cost \$2,000,000.

TORONTO, ONT. — Tenders are wanted at 16½ Queen street west for plastering.—Tenders have been taken by R. J. Edwards, architect, 18 Toronto street, for excavating for the foundation of an apartment house on Spadina avenue.—The following asphalt roadways are to be laid by the City: Shanly street, from Salem avenue to Dufferin street, cost \$5,367; Lennox street, from Bathurst street to Manning avenue, cost \$7,024; Portland street, from King to

Queen streets, cost \$6,698.—It is reported that a Montreal syndicate has purchased land on Adelaide street west of Bay and intend to erect thereon buildings valued at over \$1,500,000. Francis & Wardrope acted as solicitors in the real estate transaction.—The City Engineer has recommended the following works: Asphalt pavements, Yarmouth road, from Miles Place to Shaw street, cost \$3,618; Leslie street, from Queen to Gerrard streets, cost \$14,318; Russett avenue, from Bloor street 987 feet north, cost \$9,724; Palmerston avenue, from Barton to Fallis streets, cost \$3,859; Logan avenue, from Gerrard to Bain streets, cost \$11,791; Delaware avenue from Stanley to Hallam streets, cost \$7,094; Yarmouth road, from Manning avenue

to Christie street, cost \$3,836; concrete sidewalks: Perth Ave., from Boyce to Wallace Ave., cost \$1,887; Lucas St., from Soraren to Roncesvalles avenues, cost \$1,192; Pape avenue, from Bain to Danforth avenues, cost \$2,924; Binscarth road, from Glen road 1131 feet east, cost \$1,827; Logan avenue, from

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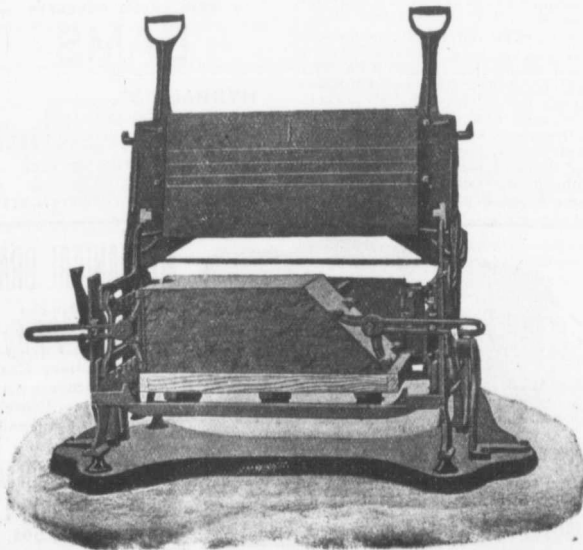
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Heward avenue 193 feet east, cost \$1,967.—The Monarch Bank of Canada have purchased the premises of Rice, Lewis & Sons, Limited, and it is reported that they will remodel the structure into an office building.—Tenders will be received up to December 17th by the Chairman of the Board of Control for the erection of a grandstand and horticultural building. Plans with G. W. Gouinlock, architect.—Plans have been adopted for alterations in the Canadian Pacific Railway building, corner King and Yonge streets to cost \$10,000.—F. H. Herbert, architect, has prepared plans for a warehouse for Edmanston, Bates & Co. to be built at corner of Duncan and Adelaide streets.—Tenders are wanted at 77 Victoria street for brick and carpenter work and excavating.—The County of York will erect a new school house in section No. 20 and will issue debentures for twenty thousand dollars to cover the cost of same.—It is understood that plans have been prepared for the proposed addition to the Confederation Life Building, and that the work is likely to be proceeded with at an early date.—The Board of Education have decided to expropriate five acres of property at the corner of Bloor street and Brunswick avenue upon which to erect the new Technical School.—It is understood that part of the congregation of Balmby Beach Pavilion church will erect an edifice on the corner of Birch avenue and Queen street.—The selection of the architect for the new General Hospital has not yet been made. At present the names of three firms are under consideration.—Z. A. Lash, solicitor, on behalf of the Canadian Northern Railway Co., is applying to the Dominion Government for extension of time in which to construct the branches of this road.—The Huron & Ontario Railway Co. are seeking permission of the Government for power to build two branch lines in Ontario.—The following building permits have been issued: Moses Moses, pair semi-detached 2 storey and attic brick dwellings, Wright avenue, near Soraraen avenue, cost \$3,800; John Marr, two detached 1½ storey brick stables, Conduit street, near Willoughby street, cost \$1,800; John Marr, three detached 2½ storey brick dwellings, Conduit street, cost \$3,000; L. C. Sheppard, three attached 2½ storey brick dwellings, Ontario street, cost \$7,000; George Vaughan, pair semi-detached 2 storey brick dwellings, Dundas street, cost \$4,000; L. C. Sheppard, 6 pair semi-detached 2 storey brick dwellings, Olive avenue, cost \$24,000; Wm. Adshear, pair semi-detached 2 storey roughcast dwellings, Dupont street, cost \$2,000; J. Anderson, pair semi-detached 2 storey and attic brick dwellings, 17-19 Woolfrey avenue, cost \$4,400; T. Eaton Co., Ltd., 1 storey addition to factory on Albert street, cost \$4,000; L. C. Sheppard, 12 pair semi-detached 2½ storey brick dwellings, Crawford street, cost \$54,000; L. C. Sheppard, 3 attached 2 storey brick dwellings, Hillsburg avenue, cost \$6,000; Leigh Todd, 2 storey and basement stone and brick dwelling, Emerson avenue, cost \$2,500; B. Panter, 3 storey and basement brick apartment house, Broadway place, cost 6,500; A. H. Moore, 3 storey brick store and dwelling, Bloor street and St. Clarens avenue, cost \$5,000; E. Heyward, 2 storey brick stable and storage shed, 807 Yonge street, cost \$2,000; Love Bros., pair semi-detached 2 storey roughcast dwellings, brick fronts, Gerrard street, cost \$2,400; W. H. Bessey, 2-storey roughcast dwelling, brick front, 274 Booth avenue, cost \$2,000; R. Robson, pair semi-detached 2 storey roughcast dwellings, brick fronts, Dufferin street, cost \$2,750; Love Bros., 2 pair semi-detached 2 storey roughcast dwellings, brick fronts, Gerrard street, \$6,000; S. B. Coon, 2½ storey brick dwelling,

Roxborough street west, cost \$5,500; R. W. Harrison, 6 attached 3 storey brick stores and dwellings, Bathurst street, cost \$18,000; R. W. Harrison, 2 pair semi-detached 2 storey brick dwellings, Seaton square and Palmerston avenue, cost \$4,000; James McGrath, 3 storey brick hotel, Sheridan avenue and Dundas street, cost \$10,000; J. A. Alexander, 2 storey and attic brick dwelling, 173 Roxboro street west, cost \$3,500; C. E. Walton, 2 storey frame dwelling 59 Leuty avenue, cost \$2,200; Gerhard Heintzman, 5 storey brick factory, Sherbourne street, cost \$20,000; B. H. Morehouse, 3 attached 2 storey, brick veneer fronts, roughcast dwellings, Langley avenue, cost \$5,400; John Dunlop, 2 storey brick dwelling, 93 Dovercourt road, cost \$3,000.

AWARDED.

MIMICO, ONT.—Erection of a hotel: W. F. Young, contractor.

PORT ARTHUR, ONT.—Clearing and grading of Munro street: Arthur Mauro, contractor.

NIAGARA FALLS, ONT.—\$73,000 debentures awarded to Wood, Gundy & Company, Toronto.

HAMILTON, ONT.—250 boulevard lamps for street lighting: American Street Lighting Company.

NORTH BATTLEFORD, SASK.—Fire engine with two 75 gallon cylinders: Watrous Engine Works Co., Brantford, Ont., successful tenderers at \$775.

PUGWASH, N. S.—Construction of an eight mile section of the Grand Trunk Pacific Railway in Quebec: R. L. McDonald and A. Smith, of this town, contractors.

BROCKVILLE, ONT.—The James Smart Manufacturing Co. have been awarded the contract for heating and ventilating the public school at Winchester Springs, Ont.

WINNIPEG, MAN.—Water pipe and specials: Camden Iron Works, Philadelphia, Pa., successful tenderers at \$45,949.

—Construction of steel shed over C. P. R. tracks: The Dominion Bridge Company Montreal, Que., successful tenderers.

VANCOUVER, B. C.—Building for the Canadian Bank of Commerce: Kelly Bros. & Mitchell, contractors.—Stone for the Canadian Bank of Commerce building: Northern Construction Company, Nanimo, B. C., successful tenderers.—Erection of a mill for Vancouver Milling and Grain Company: Smith & Sherburne, Vancouver, B. C., contractors.

TORONTO, ONT.—The contracts for city supplies have been awarded as follows: Broken stone, Rogers & Co., \$1.27 per ton; sand, delivered west of Simcoe street, Joseph Gaby, 89 cents per cubic yard; sand, east of Simcoe street, Sand & Dredging Co., Ltd., 95 cents per cubic yard; lumber, pine, Reid & Co., \$26.97 per thousand feet. Hemlock, \$21.47, with figure varying for different sizes; pine, Arthur Bryce & Co., 12x12x20 tim-

bers, \$31, hemlock \$36; cedar paving posts, Reid & Co., 19¼ cents per post; pine scantling, Reid & Co., \$14.97; cedar scantling, \$21.97; stop valves, Canadian Fairbanks Co., different sizes, from \$8 to \$42.66; lead pipe, L and M, Samuel Benjamin & Co., all sizes, at \$5.97 per cwt.; brass and bronze fittings, Canada Metal Co., bronze, 28 cents and 30 cents per lb., brass castings, 25 cents, babbitt, 12 cents; lumber, plank, Arthur Bryce & Co., \$25 per M, and boards at same price; pine or white cedar planks, Bryce & Co., \$27.

BIDS.

LISTOWEL, ONT.—The following firms have tendered for the construction of four bridges for the town: Nagle & Looty, Dublin, Ont.; C. H. Clemens, Platville, Ont.; Brantford Building & Paving Co., Brantford, Ont., and Fraser & Eichler, New Hamburg, Ont. The tenders were referred to a committee to report.

FIRES.

Stores of the Bowman Lumber Company at Comaplix, B. C., loss \$15,000.—Warehouse of the United Factories, Limited, Toronto, Ont., loss \$30,000.—Un on Supply Co.'s building, Rosthern, Sask., loss \$15,000.—Building of the Northwestern Fur Manufacturing Co., Montreal, Que., loss \$5,000.—Methodist church at Thorold, Ont., damaged to extent of \$1,000.—Stables of the Imperial Hotel, New Hamburg, Ont., loss \$3,000.—McArthur Block and adjoining buildings, Sturgeon Falls, Ont., loss \$40,000.—Moulding and glazing rooms of Robertson & Hackett's mill, Vancouver, B. C., loss \$60,000.

Word has been received of the death of R. M. Thompson, clerk and solicitor for the town of Blenheim, Ont. Deceased was on a shooting expedition when he met his death.

JNO. S. FIELDING

C. E.
CONSULTING ENGINEER

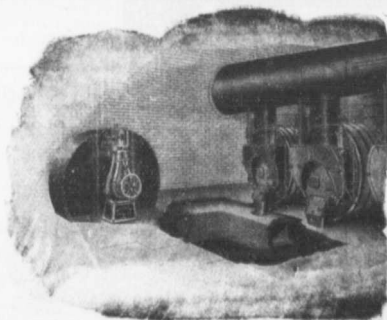
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Building permits for 402 buildings, having a value of \$1,087,692, were issued during November by the city of Toronto. For the same period last year the figures were 238 buildings valued at \$788,771. The eleven months ending November 30th saw 3288 permits issued for the erection of 4,487 structures at a cost of \$12,190,615, while for the same eleven months of 1905, 2933 buildings were erected costing \$9,743,560.

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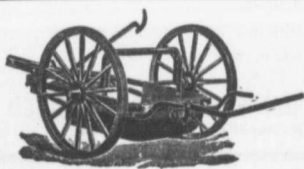
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A VETERAN CIVIL ENGINEER.

The late Colonel Henry Strange, who recently died at Rockwood, Ont., in his 92nd year, was probably the oldest civil engineer in America. He was born in Demerara, West Indies, September 16, 1815, and educated in England, coming to Canada in 1834. He built and occupied for many years the historic building in Guelph known as "The Priory," and for some years past used as the C.P.R. station. He surveyed the G.T.R. from Toronto to Sarnia, and was chief engineer in surveying the



THE LATE HENRY STRANGE.

Great Western division of the G. T. R. He also surveyed the first railway laid in Michigan, and even since his nineteenth birthday surveyed quite a large property in Rockwood for Mr. Harvey of Guelph.

RAPID SEWER CONSTRUCTION.

The Taylor Construction Company's big trenching machine, leased from the Municipal Trenching Company, Montreal, J. W. Harris, President, is working on the Fifth avenue sewer, breaking all previous records for sewer construction in Edmonton at least if not in Canada.

Yesterday they trenched and lay-

ed tile for 312 feet of sewer, and today the machine was put on to the high speed and made 330 feet, notwithstanding that over two hours was lost in the morning half of the shift, on account of a delay waiting for fuel. In the five hours from 1 o'clock until 6 p.m. 200 feet of sewer was laid. This figures out to 40 feet an hour or one foot in every 90 seconds. The ground on Second street is standing up beautifully and that part of the contract will be finished by Friday afternoon.

The Taylor Company intends to move the machine over to the First street section of the contract and commence work there on Monday. According to the work that the machine is now doing, they figure that they will do 100 feet of work a day, making a trench five feet wide by twenty feet deep. Two shifts will be kept on the concreting work in order to keep up with

the machine. Sixty men will be employed on the machine and concrete work.—Edmonton Daily Bulletin.

Mr. John Aldridge, retired builder, Toronto, will be an Aldermanic candidate at the next municipal election.

The death occurred recently at Barre Plains, Mass., of John Reid, a native of Mount Thom, Pictou County, N.S. The late Mr. Reid was for many years in the construction department of the Ware River Railway.

Word comes from Kankakee, Ill., of the death of Mr. W. McGillis. Deceased was born in Glengarry, Ont., 68 years ago, and was at one time connected with the Grand Trunk Railway. In 1858 he moved to Kankakee, where he has carried on a very extensive railway contracting business.

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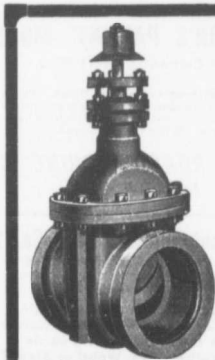
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Notes on the Septic Tank Process of Sewage Purification

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

(Continued from last issue.)

The first large city to adopt it for the sewage of its entire population was Exeter itself, with a population of 47,000, and the larger installation was opened a little over three years ago. Its example has been followed by the installation of hundreds of similar works in English cities, towns and villages; in the principal European countries, in India, in many of the Colonies, in the United States, and lately in Canada.

Without following minutely Mr. Cameron's experimental work during six years of investigation, it may be sufficient, for the purpose of this paper, to outline the process and to give a summary of results.

In obedience to the principle already referred to, the crude sewage was admitted directly into a large air-tight tank (the inlet being below the water line), without any preliminary effort to separate the solids in suspension, and trusting entirely to anaerobic bacterial agency for their decomposition and liquefaction; the tank was furnished with a glass inspection chamber, by means of which whatever visible action or movement went on within the body of the fluid was capable of observation, and much was learned in this way respecting positions of the zones of maximum activity in decomposition, and the mode of disengagement of the gases liberated.

After retention within the tank for a period providing for an extremely slow movement of the fluid from end to end, it was discharged by a special form of outlet, placed below the surface, and designed to promote uniform but imperceptible movement of the entire volume flowing, the reception and discharge being continuous; aeration of the tank effluent was then secured by passage over a weir to a set of beds of filtering material, so arranged as to be charged with the fluid periodically only; each bed being allowed to remain empty for an interval long enough for complete aeration of its pores and interstices; the processes of alternately charging and emptying these filter beds were allowed to take place gradually, and mechanical arrangements were made for uniform distribution of the tank effluent within the body of the filter.

It had already been found by Mr. Dibdin, in his experiments with London sewage, that the only essential to ensure the continued efficient working of a properly-constructed aerobic sewage filter, and to prevent the clogging of its pores, was the regular period of rest and aeration already alluded to.

A recollection of the principles which we have outlined will show that conditions were in this way provided in the Exeter tank and filter

beds, respectively, favourable to it "Anærobic," succeeded by "Aerobic" bacterial activity. In the tank, oxygen (essential to the life of the organisms aforesaid), is only found in a combined state, and the consequence of its abstraction is the breaking down of the organic matter in suspension and the liberation of such constituents as we have mentioned, the process being largely that of putrefactive decomposition; the subsequent passage of the tank effluent over the particles and through the interstices of the filtering material in thin films, and in the presence of air absorbed by the filter, brings it (under aerobic conditions), within the operations of such organisms as may be present, the result of which will be active nitrification. The Exeter installation showed that these conditions once established, and maintained in the way described, a purification of the most satisfactory character continued without interruption.

Mr. Cameron's observations through the six years probation of the method would make a long story to repeat; they showed him, however, how to apportion the times of the different stages, so as to obtain the best results, and they revealed a great many surprising and extremely interesting facts which form the basis to-day of the practical application of the Septic Tank Process.

An essential requirement is, of course, to limit putrefactive decomposition, as far as possible, to the period of sojourn by the fluid within the air-tight tank, and a very general practice now with ordinary domestic sewage is to so suit the arrangements and dimensions of the tank as to lead to the passage through it, without any perceptible current, of one day's sewage in something less than 24 hours, so that its liquid contents are once completely changed within that period. The tank effluent itself exhibits a marked purification, the extent of which will be referred to later on. For direct aeration (at first thought to be an essential), the tank effluent was originally made to pass in thin sheets over a weir, or along a channel towards the filters. This is seldom now done as it has been practically shown to be unnecessary. The filters, to which the tank effluent now passes, are so arranged as to admit of the following sequence at each filter: (1), A period of filling; (2), a period of remaining full; (3), a period of emptying; (4), a period of standing empty; each of these periods, it is found, should occupy from 1½ to 3 hours, according to the particular type of sewage to be dealt with.

The additional purification exhib-

ed by the filtrate, over the tank effluent, is referred to below.

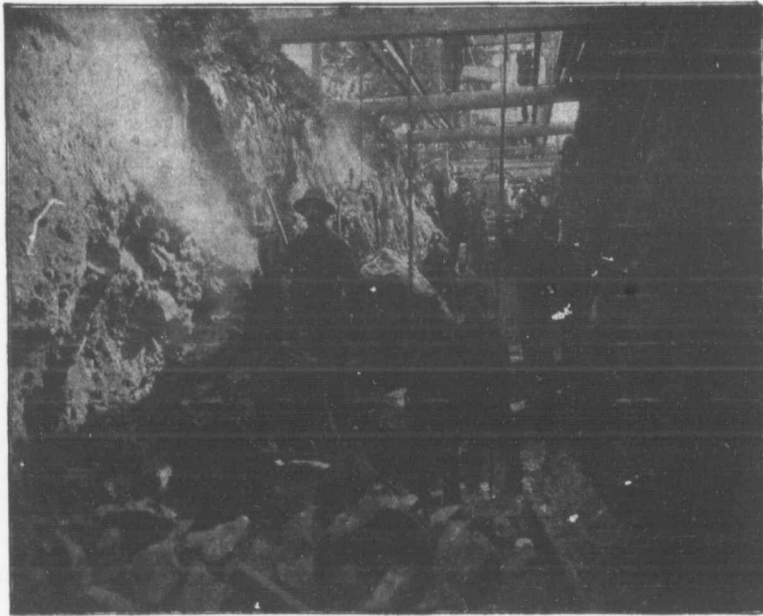
On the occasion of one of the author's visits to the Exeter experimental works, he had the opportunity of catching this effluent filtrate as it is discharged, a clear and odourless liquid. Not two hundred feet away the crude sewage was entering the tank, the embodiment of all that was objectionable.

One of the most surprising things, under the circumstances, is the very slight accumulation of solid matter that occurs in the form of sediment in the tank itself; it has been conclusively shown that the whole of the solid organic matter in suspension is, with proper management, capable of liquefaction by biological agency, sooner or later, and such sediment as necessarily remains is of a purely mineral or humoid character.

The quantity of sediment found in the experimental tank at Exeter, after a year's working, implied a decomposition of no less than 20 grains of solid organic matter for every gallon treated; the residue remaining in the tank being only about 4½ grains per gallon, and the tank was in operation continuously for five years without the slightest necessity arising for any removal of sediment. As is pointed out by Mr. Cameron in one of his papers on the subject, had the solids in suspension in this example been precipitated in the form of sewage sludge, they would have produced each year over 550 cubic yards of 9% sewage sludge—an extraordinary testimony to the scale of results attainable by these legions of tiny invisible workers.

With regard to the material used in the filter beds, experience has shown that efficiency depends more upon its mechanical condition than upon its mineral characteristics; the action that goes on is purely biological, and the essentials are a suitable habitat for the organism, a sphere for its activity, and properly-regulated supplies of food and air. Coke breeze, or crushed furnace slag, for filtering material answer perhaps the best. It will be recognized that the arrangements incidental to all that has been told, viz: The regulation of the inflow and outflow of sewage to the septic tank, the periodic admission and discharge at filters, etc., necessitated close personal supervision and attention; to obviate these necessities, and to ensure regularity, Mr. Cameron and his associates (Messrs. Commin and Martin), were led to the contrivance of various mechanical devices, by means of which the entire process was made automatic, and by means of these contrivances the larger in-

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stallation, afterwards completed for dealing with the whole sewage of Exeter and extending over 2½ acres, is now overseen by two men, the principal duties of whom are confined to the simple care of ensuring working order in the automatic gear controlling the various discharge valves, etc.

It should be stated that the comparative absence of putrefactive decomposition at the filter beds prevents the creation of a nuisance. The experimental works at Exeter, and the subsequent larger installation, are situated in a bit of low ground bordering the river Exe, and immediately below a residential district. No complaint arises of nuisance to neighboring residents, and, as the author can personally testify, little that is unpleasant can be detected, either at these works themselves, or at the many other installations of the same type with which he is more or less familiar.

The gas generated in the hermetically sealed tank sometimes exists under a certain pressure, which is, however, very variable; a typical analysis of gases thus present may be quoted as follows:—C O₂, 0.30%; C H₄, 20.3%; H₂, 18.2%; N₂, 61.2%; its composition is, of course, very variable, but the large percentages of methane (marsh gas), and free hydrogen, indicate high inflammability, and it is a most interesting fact that, by means of an incandescent mantle, these gases, of heat producing but feeble illuminating power, have been used at Exeter (and probably elsewhere), for lighting the works at night. Some idea of the degree of purification that may be expected may be obtained from quotations of the most significant features of analysis, made of both tank effluent and filtrate, respectively, at one or two installations now in operation.

FROM AN INSTALLATION AT BARHEAD, SCOTLAND.

	Crude Sewage.	Tank Effluent.	Filtrate.
Organic and volatile matter in solution	10.86	11.55	2.760
Albuminoid ammonia	0.30	0.34	0.051
Total ammonia	2.93	2.95	0.866
Nitrogen as nitrates and nitrites	nll	nll	0.918
Oxygen absorbed by organic matter	2.83	3.06	0.670
Color (Loch Katrine water=10)	25	20	7

Total purification shown in filtrate as compared with tank effluent, judged by albuminoid ammonia = 84.7%; or judged by oxygen absorbed, 78%.

Analysis at experimental test installations at Manchester and Leeds show 85% to 87% albuminous purification, and 89% to 93% purification as judged by oxygen absorbed, with a purification of tank effluent over crude sewage rising to over 60%.

Analysis of results from an installation at Yeovil (a town producing, through its particular industries, a sewage of unusual foulness and complexity), give averages about as follows:—

Tank effluent, as compared with

crude sewage, 64.8% purification. Filtrate effluent, as compared with crude sewage, 87% purification.

The Exeter filtrates were stated, in a report by Mr. Dibdin, to be in a condition rendering them fit for discharge into a stream or river of relatively small volume; and as showing no signs of putrefaction or offensive secondary decomposition on keeping.

Analysis of the results of the process are embodied in reports by many of the foremost chemists in the kingdom; Mr. Dibdin, Dr. Rideal, Mr. G. J. Fowler, chemist to The Rivers Committee of The Manchester Corporation, and others; from some of which the above figures have been selected; they all indicate the production, in the filtrate, of a highly nitrified effluent, rich in dissolved oxygen (the nitrates often exceeding one part per 100,000)—these characteristics prove permanence in the purification effected, and absence of liability to the putrefaction which may follow mere temporary sterilization.

In a nitrified effluent, oxidation of any organic matter present will be continued even after contact with the filters may have ceased; indeed, it has been proved at Manchester that the filtrate improves the state of the water in the Manchester ship canal into which it is discharged, and that the addition of it, in equal parts, is sufficient to arrest a putrefaction in the latter, which takes place when it is kept without any such admixture.

Even in the tank effluent we have a purification comparable with that effected by any chemical or precipitation processes, without the accompanying difficulties due to the "Sewage sludge."

The scope of the present paper does not admit of the discussion of minor variations in method of treatment, dictated by variations in character of sewage, and in climatic influences;—a very wide experience, during the past ten years, has certainly proved that the septic tank and the contact beds are together equal to dealing with sewage of the worst types, and their efficacy has been tested under the greatest variations in climate.

The author has had, perhaps, some special opportunities of following the development of the process from its incipency, through a personal acquaintance with Mr. Cameron and some of those associated with him, and he has been able to visit a number of works in operation; it is his belief that in its application will lie the means of dealing with the sewage disposal difficulties, yearly becoming more acute in so many Canadian towns and villages, especially those of the lake districts, where contamination of water supply is becoming increasingly serious in its consequences. In this connection it may be added that experiments conducted

some time ago by Dr. Ransom Pickard, F.R.C.S., aiming at comparisons of percentages of typhoid bacilli present after the addition of typhoid bacillus cultures to crude sewage untreated, and to sewage afterwards submitted to the septic tank and contact beds process, admitted of the preparation of the following table, taken from Dr. Pickard's report upon the subject.

Results of addition of Cultures of Typhoid Bacilli to Crude Sewage taken from the Exeter Installation :

On the elapse of	% Typhoid Bacilli present
0 hours	100.
24 "	76.14
48 "	60.55
7 days	8.16
14 "	0.73

The application, to the same infected sewage, of the septic tank and biological filter process, as carried out in Dr. Pickard's laboratory, indicated a speedy removal, by tank and filter, of a fair 90% of the bacilli; with the result, moreover, that of the bacilli passing from the biological filter, in successive periodic filtrations, subsequent to the first contamination of the crude sewage, the second filtration showed but 1.41%, and the third is given as 0.491%.

A doubt would naturally arise respecting the maintenance of efficient action of contact beds in the face of the extreme cold of a Canadian winter. As before stated, it is but comparatively lately that information on this point has been forthcoming. Respecting some of the experiences gained on this continent, the writer can speak personally.

Towards the end of the very severe winter of 1903-4, he received an invitation from the American Cameron Septic Tank Company to visit certain of their installations in Northern Illinois and Iowa, for the purpose of making enquiry respecting their operation during that season; amongst other visits, one was paid to a plant in the neighborhood of Davenport, Iowa. The winter had been phenomenally severe, and at Davenport, at the time of the visit, ice was reported upon adjacent parts of the Mississippi river exceeding 30 inches in thickness. The mean temperature at the place, for January and February, was not as high as 17° F, the mean of minimum temperatures for the same period was barely 9° F, yet the author was assured by the attendant that no ice formed upon the contact beds which was not immediately dissipated by the next charge of sewage, and that the heat of the sewage itself proved quite sufficient to prevent any failure in the action of the alternating valve gear, which, in installations exposed to a severe winter, it is the custom of this company so to place as to receive the effect of radiant heat from the comparatively high temperature sewage. The author, on the occasion of his visit, collected some of the filtrate as it was dis-

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charged;—it exhibited a very slight odour at the time, but proved sufficiently nitrified to afterwards completely purify itself, and it is still in his possession—a clear and odourless liquid remarkably free from sediment.

Under extreme cold it may, perhaps, be necessary, with contact beds of large surface, to resort to the expedient of forming an undulating or ridged surface, so that dissipation of an ice film may be assisted by its fracture under its own weight on settlement.

In temperate climates, the sewage is generally distributed over the surface of contact beds by means of open channels, but the American Septic Tank Company has found it better in northern latitudes to use porous ducts, or pipes with open joints, laid just beneath the surface of the bed.

This paper should not be closed without some general remarks upon the cost of the process, which must necessarily vary with locality and population, nature of sewage to be dealt with, etc., etc. As to capital expenditure, limits in Canada may perhaps be safely stated of \$3.50 per capita for populations of 40,000 to 50,000; to \$12.00 per capita, under somewhat extreme conditions and for small communities.

In cases of almost any chemical or mechanical purification methods, working expenses, disposal of sludge, etc., etc., lead to a very considerable annual expenditure, easily rising to 10% upon capital outlay, even with large installations; and a highly-important feature of the Septic Tank Process is its practical solution of the sewage sludge problem and the consequently low annual expense involved.

Apart from this, however, it is clearly a process for which nature has made direct provision, and in which the observance and co-operation of natural laws are the only requirements; it has been abundantly verified that careful design, in which due regard is paid to character of sewage, regularity or irregularity of flow, influences of climate, etc., etc., together with very slight but intelligent oversight, are sufficient to produce and maintain conditions necessary to the operations of these wonderful laws and activities provided for so beneficent a purpose.

It must be observed that a tank, and its associated contact beds, do not immediately develop their full biological efficiency; the development of organic life, to an extent necessary to deal with the volume of sewage flowing, requires time in both tank and filters. In the former, a scum of varying thickness is found to accumulate upon the surface, and it is essential that this be not disturbed (a reason, amongst others, for submerged inlet and outlet); this scum abounds with bacteria and is, perhaps, their principal home

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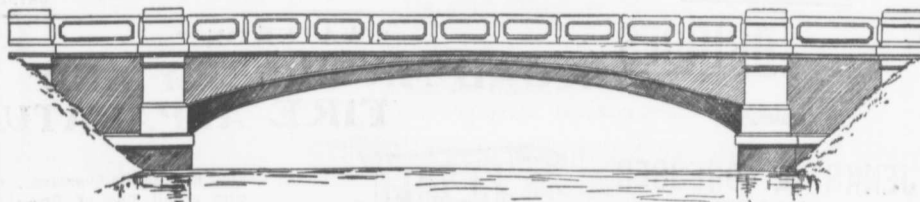
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and laboratory. In the same way it is only after repeated charging that the contact beds become well stocked with their colonies of bacilli, and that the nitrifying action reaches its maximum; continuous improvement in this respect may go on for weeks after the inception of an installation.

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In preparing these notes the author is largely indebted to the reports and writings of many whose names are mentioned in the paper, those of Dr. Thudicum, Dr. Simms Woodhead, and others.

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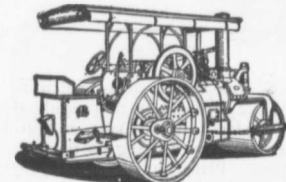
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1904	44	O.K.	3.150	2.0	132	342	300	744	848	914	938	86	262	354	401	427

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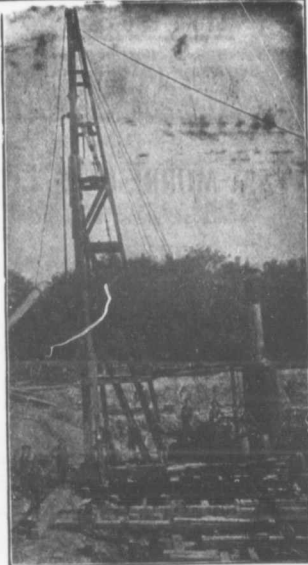
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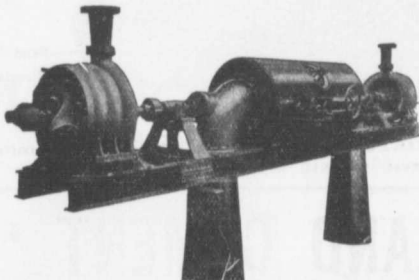
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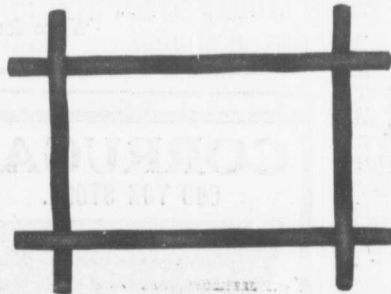
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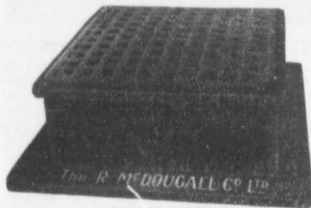
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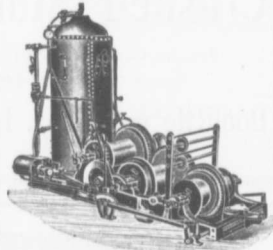
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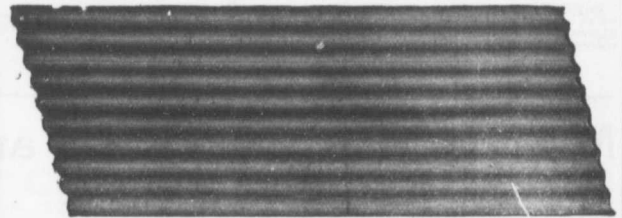
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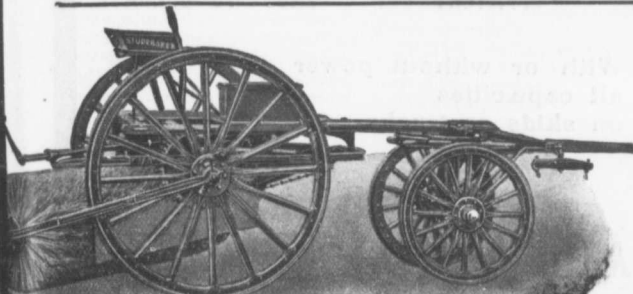
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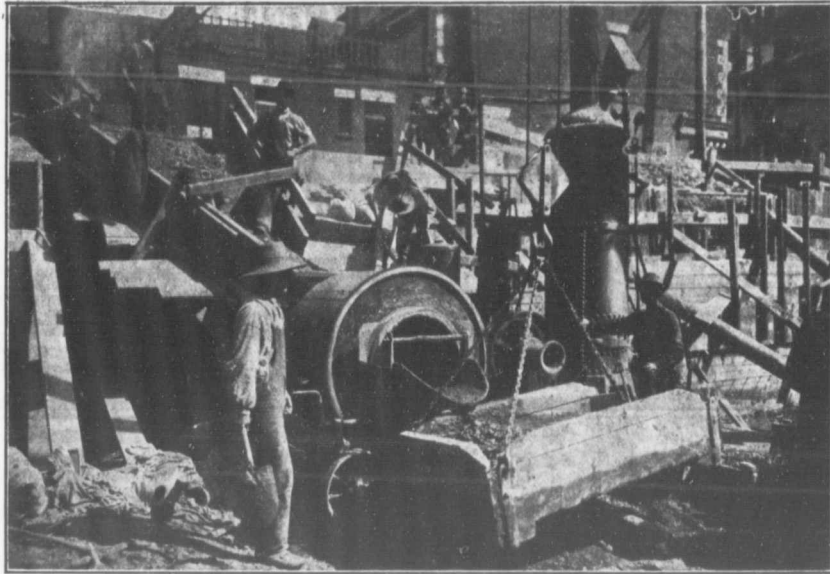
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