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CANADIAN CONTRACT RECORD

A WEEKLY JOURNAL

PUBLIC WORKS • TENDERS •
ADVANCE INFORMATION •
AND MUNICIPAL PROGRESS

EVERY THURSDAY

This paper reaches every week the Town and City Clerks, Town and City Engineers, County Clerks and County Engineers, Purchasers of Municipal Debentures and leading Contractors in all lines throughout Canada.

Vol. 8.

OCTOBER 28, 1897

No. 39.

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Will be received up to 5 o'clock p.m., THURSDAY, NOV. 11th, for the construction of Sections L, M, N and O of the London Sewerage System, consisting of 8,101 ft. of Brick Sewer and 3,632 ft. of 18-inch Tile Sewer.

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CONTRACTS OPEN.

YARKER, ONT.—E. W. Benjamin will put an electric light plant in his factory.

WOLFVILLE, N. S.—A. H. Calhoun, of St. John, will erect a cornmeal mill here.

NORTH BAY, ONT.—A new power house will be built by the electric light company.

WINDSOR MILLS, QUE.—The construction of waterworks and drainage systems is advocated.

ST. JOHNS, QUE.—Tenders have been invited for repairs and improvements to the post-office.

DOUGLAS, ONT.—Steps have been taken looking to the erection of a lock up and court house.

TILBURY EAST, ONT.—George Taggart has purchased property on which he will erect a residence.

SARNIA, ONT.—The site for the proposed post-office building has not yet been definitely decided upon.

VERDUN, ONT.—John Cain offers to build a brick rink, costing \$5,000, provided he is given a bonus of \$1,000.

BLACKVILLE, N.B.—It is rumored that H. & F. D. Swim, of Doaktown, intend building a factory at this place.

FREDERICTON, N. B.—W. J. Scarr is erecting three residences, and purposes building two more next spring.

SUSSEX, N.B.—It is proposed to erect a building on the Agricultural grounds, at a cost of several thousand dollars.

LONDON, ONT.—A by-law to raise \$25,000 for waterworks extension has been given its third reading in council.

SHERBROOKE, QUE.—The new Anglican church will cost \$30,000, and will be completed within the next two years.

ST. HYACINTHE, QUE.—The town council have decided to float a loan of \$90,000 in Montreal for the local aqueduct.

SHAWVILLE, QUE.—The village clerk has received a letter from a gentleman who desires to build a tannery in this village.

BARRIE, ONT.—Mr. J. H. Killey, engineering expert, of Hamilton, is preparing a report on the waterworks plant of this town.

AMHERSTBURG, ONT.—The municipal council has given notice of its intention to construct a sewer on Richmond street, at a cost of \$5,867.

ST. FRANCOIS, QUE.—Tenders for the construction of an iron and steel bridge close on November 1st. Address Joseph Denis, secretary.

HANOVER, ONT.—The Knechtel Furniture Co. have commenced work on the foundation of a four-story addition to their factory, 50 x 56 feet.

WELLINGTON, ONT.—A joint stock company has been formed to erect a flour mill.—Fred Ackerman will build a drug store and residence.

LAKEFIELD, ONT.—The council have offered the Dickson Co., of Lakefield, exemption from taxation as an inducement to erect a saw mill here.

DESERONTO, ONT.—The Rathbun Company have submitted a proposition to the Ontario government to establish a factory for the manufacture of wool alcohol.

WOODSTOCK, ONT.—A project is mooted to build an electric railway between this city and Ingersoll. Toronto capitalists are said to be interested.

CHATHAM, ONT.—M. S. Benson, town clerk, will receive tenders until Friday, 29th inst., for plumbing and heating by steam or hot water of the public building.

FORT WILLIAM, ONT.—Steps will be taken at once to construct waterworks and electric light systems. Specifications will be prepared by George White Fraser, of Toronto.

GALT, ONT.—A by-law to provide the sum of \$13,000 for the erection of a fire-hall, the enlargement of the market square, and other works, will shortly be submitted to the people.

ALMONTE, ONT.—Archie McLean has decided to erect a solid brick block. A. J. McLean has leased one of the new stores, in which he will place a steam engine and boiler.

HALIFAX, N. S.—On the report of the City Engineer, the council will, in the spring, construct granite curbing and gutters on both sides of Cornwallis street, at a cost of \$11,000.

IROQUOIS, ONT.—A by-law was voted on by the ratepayers on the 25th inst. to raise \$8,500 for the installation of an electric light plant. We have not learned of the result of the vote.

PONT ROUGE, QUE.—Mr. McDougall, president of the Montreal Quarry Company, has purchased the pulp mill here for a syndicate, who intend to expend some \$50,000 on the property.

THAMESVILLE, ONT.—J. A. Land is about to build a residence on Victoria street.—The Methodist congregation have decided on the location of their new church, which will be erected next summer.

TILSONBURG, ONT.—James Bell, C.E., of St. Thomas, is preparing plans for a steel bridge over Big Otter creek at this place, for the Tilsonburg, Port Burwell & Pacific Railway. It will be 600 feet long.

COLCHESTER SOUTH, ONT.—The Colchester South council have passed a by-law to issue debentures for the sum of \$1,600, to purchase sites and erect two new school houses in School Section No. 10.

MOREWOOD, ONT.—Tenders for the erection of a two-story brick school house are asked until Monday, November 15th. Plans may be seen at the store of A. D.

Hunter, to whom tenders are to be addressed.

WALKERVILLE, ONT.—The Milner-Walker Wagon Works Co. have been incorporated, and will build a plant to cost \$100,000. The promoters are Hiram Walker, sr., J. R. Milner, J. E. Milner and E. R. Pierce.

HULL, QUE. The engineering staff of the Pontiac & Pacific Junction Railway have completed their surveys of the proposed road between Aylmer and Hull. Construction work will likely be commenced at once.

WATERLOO, ONT.—The councils of Waterloo and Berlin will be requested to provide funds to build a hospital for contagious diseases. The probable cost will be ascertained, after which an architect will be asked to prepare plans.

MIDLAND, ONT.—Mr. Arthur White, of the G.T.R., conferred with the municipal authorities here last week with regard to the agreement for the construction of a large elevator. A bonus of \$20,000 was voted last spring by the town for this building, but work has not yet been commenced.

WINDSOR, N. S.—John Doran, whose hotel was burned in the recent fire, will at once commence the erection of a new building. The Windsor Plaster Co., the Wentworth Gypsum Co. and the Windsor Furniture Co. will each rebuild at once.—Watson Dill has commenced the erection of a dwelling house.

WINNIPEG, MAN.—A special meeting of the city council will shortly be held to consider Mr. Rudolph Hering's report on the proposed waterworks system.—The Dominion Elevator Co. will build elevators at Red Deer and Leduc, Man., and the Manitoba Elevator Co. will build one at South Edmonton, N.W.T.

MAGOG, QUE.—A. G. Dolloff has received the plans for his new block, which will be solid brick, three stories.—D. Pepin has purchased property on which he will build at once.—Joseph Corriveau and A. H. Moore & Co. submitted tenders for the erection of the power house. No award has as yet been made.

QUEBEC, QUE.—Tanguay & Vallee, architects, are preparing plans for a cottage to be built for Jules Belanger, merchant, of Beauport; probable cost, \$3,000.—The city will seek amendments to its charter to authorize the raising of a loan for the paving of the principal streets of the city with asphalt, brick, or other permanent material.

ST. THOMAS, ONT.—The engineers of the counties of Elgin and Middlesex have examined the bridges between these counties which cross the river Thames. They have decided that it is necessary to reconstruct the Coyne road bridge. The new structure will cost \$20,000.—An addition, 26 x 71 feet, three stories, is to be erected to the Duke House.

PETERBORO', ONT.—Two manufacturing companies are said to be considering the question of locating in this town.—Mr. B. F. Ackerman proposes putting in considerable new machinery.—A movement is on foot here to purchase from the Grand Trunk Railway Co. the line of railway extending to Lakefield and Chemong, with a view to its conversion into an electric road.

KINGSTON, ONT.—Power & Son, architects, have invited tenders for improvements to building, corner Princess and King streets, for Joseph Quigley.—It is stated that the Grand Trunk Railway Co. will spend \$25,000 in making alterations to their wharf and freight shed in this city.—A committee of the Board of Trade have inspected sites for the proposed summer hotel, and it is thought that at an early date work on the building will be commenced.

MONTREAL, QUE.—The Grand Trunk Railway Co. have decided to erect an office building on their property at Point St. Charles, at a cost of \$15,000. The plans are now in course of preparation.—At the last session of the provincial legislature the sum of \$10,000 was authorized for improvements to the city building, but the Finance Committee have not as yet voted the money. The Mayor has suggested that a new central fire and police station might be erected opposite the city hall, on Notre Dame street.—The City Surveyor invites tenders this week for the construction of sewers on St. Denis and De Montigny street.—The Chambre de Commerce of Montreal has under consideration the plans for the extension of Bonsecours market.—A proposition has been made that the city purchase the old Victoria School of Medicine, opposite the Hotel Dieu, as a morgue, in which case extensive alterations would be required.—Jos. Sawyer, architect, has prepared plans for a house to be built on Laval avenue for M. Rochon.—Macduff & Lemieux, architects, are calling for tenders for four dwellings to be erected on La Salle street, Maisonneuve, for R. Beauchamp.—A. F. Gault, merchant, is having plans prepared for stores and dwellings to be built at the corner of Guy and St. Antoine streets.

OTTAWA, ONT.—It is rumored that the C.P.R. will build a new central depot near the Maria street bridge.—There is a movement on foot to erect a large hall for the use of the English-speaking Catholic societies of this city. The project is to erect a building to cost between \$12,000 and \$20,000, to be equipped with gymnasium, billiard rooms, lecture and reading rooms. The Ancient Order of Hibernians are the prime movers, and it is expected that subscriptions will at once be solicited.—Tenders have been invited for furnishing the new Masonic Hall in walnut, oak and mahogany.—It is stated that there is not a bridge of any kind over the Nation river in Cambridge township, Russell county, owing to the destruction by the recent fire.—It is proposed to build an addition to the Kilburn Sister's Church School.—A meeting of the Fire and Light Committee has been called to discuss the proposed new station to be erected at the corner of Lyon and Albert streets.—The Ottawa Specialty Co. is erecting a large addition to their factory on Duke street, 60 x 40 feet, four storeys, solid brick, with stone foundation.—The Minister of Public Works will ask the Dominion Parliament for a large sum of money for extending the Government telegraph lines in the Northwest and British Columbia.—A new dynamo will be placed in the Russell House.—Mr. W. H. Lever, an English soap manufacturer, purposes establishing a branch factory in Canada, and an effort is being made to secure its location in this city.

HAMILTON, ONT.—It is reported that the store occupied by W. J. Waugh, corner King and John streets, and the adjoining premises, have been purchased by a company who purpose erecting a large dry-goods store on the property.—Rev. Dr. Burns is having extensive alterations made to the Ladies' College building. The building will be heated by steam throughout.—T. Beasley, city clerk, will receive tenders until noon of Monday, November 5th, for the construction of a 65-foot Hayes aerial hook and ladder. Specifications at the office of the chief engineer of the fire department.—The Electrical Power & Manufacturing Co. have asked the city to grant them permission to supply electric light and power throughout the city.—The Finance Committee will recommend the council to advertise for tenders for debentures to the amount of \$25,000, to cover the cost of constructing the high level bridge.—It is quite probable that the Hamilton & Toronto Sewer Pipe Co. will rebuild their factory

on the old site, the council having agreed that the company's assessment shall not be increased above \$8,000.—The Leo Literary Society has decided to call for tenders for extensive alterations to be made to St. Mary's Hall.—The Fire and Water Committee have recommended the council to purchase another combination chemical engine and hose wagon.—A sewer will be built on Walnut street, from Hunter to Maria street, at a cost of \$1,200.—Building permits have been granted as follows: E. B. Patterson, two-story brick dwelling on Victoria avenue, for Walter Holt, cost \$1,100; W. A. Edwards, alteration to Ladies' College building, cost \$8,000.

TORONTO, ONT.—Rev. Mr. Warden has purchased property on the south-west corner of St. George street and Lowther ave. on which he will erect a residence.—Work has been commenced on two residences on St. George street, north of Lowther ave.—A building permit has been granted to Mr. John Ross Robertson, proprietor of the Evening Telegram, for a four-story pressed brick office building, with cut stone facings, to be erected on the south-east corner of Bay & Melinda streets. The cost will be \$35,000. Matthew Sheard, architect.—The Technical School Board have arranged for a meeting of the University authorities on November 8th, to discuss the proposed extension of the school buildings.—In his annual report, the City Engineer states that the pumping plant in the old engine house is of an antiquated description, and should be replaced by high duty engines.—The ratepayers will be asked to vote on two questions, first, as to whether they favor the construction of a civil plant for lighting streets and public buildings; second, as to whether they favor an electric plant for commercial power and lighting purposes.—In his fortnightly report to the Board of Works, the Engineer estimates the cost of laying the new mains for the protection of the Exhibition buildings at \$9,775. The following works are recommended: Asphalt pavement on Station street, to cost \$10,000; macadam roadway on Davenport road, between Yonge street and Hazleton avenue, cost \$5,500; concrete walk, west side of Church street, between Adelaide and Queen, cost \$1,538; concrete walk, east side Church street, between Front and King streets, cost \$960; brick walk, south side Bloor street, between Yonge and Sherbourne streets, cost \$2,035; brick walk, north side of St. Patrick street, between Huron and Beverley streets, cost \$488.—The City Engineer recommends that the dead ends of sewers on Tyndall ave. and Springhurst ave. be connected, at a cost of \$1,300.—Building permits have been granted as follows: Gutta Percha & Rubber Company, brick addition to factory on O'Hara ave., cost \$9,000; C.P.R., ice house, south of the Esplanade, west of York street, cost \$1,000; Miss Greenshields, addition and alterations to residence, north-west corner St. Joseph street and Elmsley place, cost \$3,000; A. Horton, 64 Howard street, pair semi-detached 2-story and attic brick dwellings, 58 Howard street, cost \$5,000; Jos. Dean, 8 West Lodge ave., 2-story brick stable, south side Queen street, between Dunn ave. and Close ave., cost \$2,000.

FIRES.

The planing mill of Isaac Walker, 1236 Yonge street, Toronto, was damaged by fire on Monday last to the extent of \$1,500; no insurance.—The Verity Plow Company's factory at Brantford, Ont., was completely destroyed by fire on Tuesday last. The loss will probably reach \$60,000, fully covered by insurance.—The residence of Charles McLerie, corner Caron avenue and Clark street, Windsor, Ont., was almost totally destroyed by fire recently. Loss \$5,000.—Eusebe Boulet's

residence at St. Charles Borromeo, Que., has been burned.—The cheese factory at Paramount, Ont., was completely destroyed by fire on the 23rd inst.—The planing, shingle and saw mills and residence of William Ball at Papineauville, Que., were completely consumed by fire last week. Loss \$3,000, no insurance.—A cheese factory near Napanee, Ont., owned by Robert Metzler, was burned recently. The loss on factory and machinery is \$2,000.—The Howell Lithographing Co.'s establishment at Hamilton, Ont., was damaged by fire recently to the extent of \$5,000, largely covered by insurance.

CONTRACTS AWARDED.

VILLEROY, QUE.—The town has disposed of \$6,000 of debentures to J. H. C. Charette, of Montreal.

HUNTSVILLE, ONT.—R. Wilson Smith, of Montreal, has purchased \$6,000 of town debentures, at \$5,970.

MELROSE, ONT.—Ryerson Badgely, of Plainfield, has the contract for building the Methodist parsonage here.

PRESTON, ONT.—The tender of William Kribs, of Hespeler, has been accepted for building a rink; cost \$2,600.

ST. JOHN, N. B.—The contract for the building of eight steel buoys for the Marine Department of Canada has been awarded to James Fleming.

EXETER, ONT.—Contracts have been accepted for a brick residence for Thomas Rowe: Brick work, George Heaman; carpenter work, Richard Gould.

DUNDAS, ONT.—The contract for the mason work of the new fire hall has been let to George E. Mills, of Hamilton, at \$1,155. L. Hickey tendered at \$1,170.

WINNIPEG, MAN.—Evans Bros. & Shields have been given the contract for work on the new branch of the Great Northern Railway, the value of which is estimated at \$100,000.

BROCKVILLE, ONT.—George Ross, plumber, has been awarded the contract for heating with hot water the St. Lawrence hotel at Morrisburg, and the residence of J. S. Jamieson at same place.

SELKIRK, MAN.—The addition to the Asylum is being pushed along well by the contractors, Davidson Bros. The roof is on and the new boilers are being set up. Mr. Greenfield, of Winnipeg, is architect.

CHARLOTTETOWN, P. E. I.—The Montreal Roofing Co., of Montreal, are roofing the new R. C. cathedral in this city. The contract for heating and plumbing has been awarded to Blondin & Co., of St. Hyacinthe.

FORT STANLEY, ONT.—The Lake Erie & Detroit River Railway Co. have awarded the contract for improving the property here to Flook & Babcock, of Chatham, the price being \$36,250. The work is to be completed by August, 1898.

ORILLIA, ONT.—\$3,000 of school debentures have been sold to R. Wilson Smith, of Montreal, at \$3,489.27. The other tenders were: Wm. Whittell, Hamilton, \$3,270; H. O'Hara & Co., Toronto, \$3,431.72; Hanson Bros., Montreal, \$3,481.50; George A. Stinson, Toronto, \$3,471.

GUELPH, ONT.—The following tenders have been accepted for a one story addition, 32 x 34 feet, at the water works building: Stone and brick work, D. Keleher; carpentering, F. W. Darby; painting, W. Scriven; plastering, Dunbar & Shaw; architect, Geo. R. Bruce.

HAMILTON, ONT.—The Cataract Power Co., of which Hon. J. M. Gibson is president, has closed a contract with the Royal Electric Co., of Montreal, for the electrical apparatus required for the development of the water power at DeCew Falls. The scheme will include the building of a canal from Allanburg to the power house, a dis-

tance of 4 1/2 miles, the contract for which has been let to Angus McDonald & Co. The canal will be from 40 to 45 feet wide.

LONDON, ONT.—Tenders were received as below for section "Q" of the London sewerage system. Harding & Leathorn—Wharncliffe to Edward, \$1,800, and Edward street to Briscoe, \$2,685; both sections, \$4,399. W. H. Gould—Wharncliffe road to Bruce street, \$1,700, Edward street to Briscoe, \$2,600, total, \$4,300. A. Burnett—Bruce street to Edward, from Wharncliffe road, \$1,745.25; Edward street to Briscoe, \$2,618.50; combined, \$4,363.75. The tender of W. H. Gould has been accepted.

QUEBEC, QUE.—Contracts have been awarded as follows by E. M. Talbot, architect, for a residence to be built on St. Foye road for P. C. Lacasse: Masonry, Emile Cote; joinery, painting and roofing, Ed. Matte.—Building permits have been granted as follows: Repairs of a house on Huteuil street for Mr. Harris; contractor, P. A. Lamonde. Addition to a house, two stories, wood lined in brick, flat roof, on Bayard street, for N. Despatie. Reparation on Victoria street for Mr. Paradis. Addition, two stories, wood lined in brick, 26 x 19 feet, on Bedard street, for J. Dompierre; contractor, M. Ratte. New foundation on Bedard street for M. T. Gagnon. Reparation of a house, corner of Sault au Matelot and Mountain Hill, for the Chicnic Co.; contractor, S. Peters.

MONTREAL, QUE.—Chapleau & Leveouf have the contract for constructing a hay loft for the city, at \$1,050.—J. Rawson Gardiner, architect, has accepted the following tenders for two houses on Prospect street, Westmount, for Mr. Evans: Stone work, J. W. Wilson; brick work, J. Peel; wood work, W. Swan; plumbing, J. W. Hughes; plastering, Thos. Brethour; roofing, Montreal Roofing Co.; electric wiring, J. E. Scott.—

David Ogilvy, architect, has awarded the following contracts for a residence and stable on Drummond street for John D. Duncan: Masonry, J. O. Martineau; carpentry, T. Bernard; bricklaying, J. O. Martineau. The building will be three stories, stone front, cost \$3,000. Fowler & Gardiner, architects, have accepted tenders as follows for two stores and dwellings on Craig street, for the Estate Idler: Stone work, Payette & Labelle; brick work, J. W. Peel; wood work, Bickham & Scott; plumbing, J. Ballintyne; plastering, Knott & Gardner; roofing, Campbell & Gilday; electric wiring, J. E. Scott; painting, J. Murphy. Same architects have let the contract for alterations to bank building, for Molson's Bank, at Sorel, to R. E. Edwards & Son.—Building permits have been granted as follows: Three houses, wood lined in brick, on Delorimier street, for M. C. Bourdon; masonry contractor, M. Bowin. One grain elevator, on St. Frs. Xavier street, for C. W. Trenholm. Alterations of two houses, corner Craig and Beri streets, for Narcisse Demers; carpenter, Jos. Reed.

BUSINESS NOTES.

The firm of S. H. Grant & Co., plumbers, Halifax, N. S., has been dissolved, F. Wright retiring.

Aristide Belair, contractor, Maison-neuve, Que., is reported to have assigned, with liabilities of \$10,000.

G. A. Stinson & Co., debenture and mining brokers, Toronto, have removed from Toronto street to the Manning Arcade, King street west.

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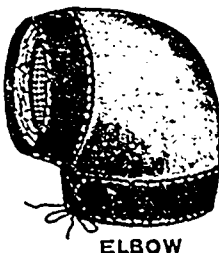
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MARKET CONDITIONS.

Wire nails are decidedly firm, and it is believed that there is a movement on foot looking to a further advance. Wrought iron pipe has advanced, and wholesalers now quote as follows: $\frac{1}{4}$ to $\frac{1}{2}$ inch, \$1.87; $\frac{3}{4}$ -inch, \$2.35; $1\frac{1}{4}$ -inch, \$2.87; 1-inch, \$3.87; $1\frac{1}{2}$ -inch, \$5.10; $1\frac{3}{4}$ -inch, \$6.38; 2-inch, \$9.25. Trade in paints and oils is very satisfactory, both in Montreal and Toronto. Cement is active. Last week we announced an advance in English brands. This has been followed by a rise of 5 cents per barrel on outside prices for Belgian, due to the fact that Belgian makers put up prices 3 cents per barrel and ocean freight rates are also 2s 6d per ton higher. The prospects are that prices will rule still higher on the Montreal market, as stocks in the hands of importers are unusually light. Business during the week has been active both for local and western account, and some large sales have been made, including one lot of 1,000 barrels Belgian at \$1.95 ex-wharf, and several other lots of 400 and 500 barrels at the same figure. English cement is scarce on spot, and prices are fully maintained at the recent advance.

"TIPS" FOR CARPENTERS.

The National Builder gives the following useful hints for carpenters:

Never compete with a "botch" if you know he is favored by the person about to build. He will undercut and beat you every time.

In tearing down old work be as careful as in putting up new.

When putting away old stuff see that it is protected from rain and the atmosphere.

It costs about 15 per cent. extra work to put up old material, and this fact should be borne in mind, as I have known several contractors who paid dearly for their "whistle" in estimating on working up second-hand material.

These remarks apply to woodwork only. In using old bricks, stone, slate and other miscellaneous materials, it is as well to add double price for working up.

Workmen do not care to handle old

material. It is ruinous to tools, painful to handle, and very destructive to clothing.

In my experience I always found it paid to advance the wages of workmen—skilled mechanics—while working up old material. This encouraged the men and spurred them to better efforts.

Sash frames, with sash weights, locks and trim complete, may be taken out of old buildings that are being taken down and preserved just as good as new by screwing slats and braces on them, which not only keeps the frame square, but prevents the glass from being broken.

Doors, frames and trims may also be kept in good order until used, by taking the same precautions as in window frames.

Old scantlings and joists should have all nails drawn or hammered in before piling away.

Counters, shelving, drawers and other store-fittings should be kindly dealt with. They will be wanted sooner or later.

Take care of the locks, hinges, bolts, keys and other hardware. Each individual piece represents money in a greater or lesser sum.

Sinks, wash-basins, bath-tubs, traps, heating appliances, grates, mantels and hearth-stones should be moved with care. They are always worth money and may be used in many places as substitutes for more inferior fixings.

Marble mantels require the most careful handling.

Rails, balusters and newels may be

utilized much readier than stairs, as the rail may be lengthened or shortened to suit variable conditions.

Gas fixtures should be cared for and stowed away in some dry place. They can often be made available, and are not easily renovated if soiled or tarnished.

It is not wise to employ men who have nothing but their strength to recommend them. As a rule they are like bears—have more strength than knowledge, and lack of the latter is often an expensive desideratum. Employ for taking down the work good, careful mechanics, and do not have the work "rushed through. Rushers of this sort are expensive.

Have some mercy for the workman's tools. If it can be avoided do not work up old stuff into fine work. If not avoidable pay the workmen something extra because of injury to tools.

Don't grumble if you do not get as good results from the use of old material as from new. The workman has much to contend with while working up old nail-speckled, sand-covered material.

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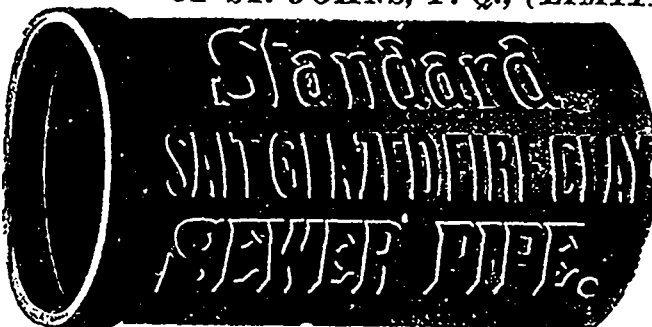


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THE SCIENTIFIC BASIS OF SEWAGE TREATMENT.*

By W. J. DIBBIN, F. C. S., ETC., AND GEORGE THUDICHUM, F. C. S.

The question of sewage purification has now reached a stage at which old ideas are being rapidly replaced by new, based upon the advances which have recently been made in the direction of treatment by natural agencies, concentrated and controlled by art. It must not be considered that the authors, in attempting to formulate the present position, desire it to be thought that they are able to set forth the whole of the factors which are brought into play in the course of the destruction of waste matter; their object is rather to show the broad principles which have been established as the result of no little practice. That, speaking generally, all sewage operations of a successful character must be carried out in accordance with these principles, the authors are convinced; they are, however, fully aware that a large number of questions remain to be solved, before knowledge on the subject can be in any sense complete. It is by following the general lines laid down, and by avoiding those which by many have been hitherto considered as essential, that the complete solution of the problem may be found.

Before dealing with the manner in which purification is to be effected, it will be advisable to consider what it is that has to be done. Sewage is a mixture of a most varying and complex character, of animal and vegetable derived substances, in different stages of decomposition; and contains also in many cases, besides ordinary mineral salts, considerable quantities of trade refuse matters of both organic and mineral nature. The organic matters derived from excreta are, insoluble remnants of food and soluble albuminous matters, fatty acids, bile decomposition products, colouring matters, fat, sugar, excretin, etc., and substances derived from the destruction of the constituents of urine, including urea, which is the principal product of the metamorphosis in the body of nitrogenised food. Since a healthy man secretes from 30 to 40 grammes of urea per diem, this substance may be taken as an example to show what work has to be effected in completely oxidising nitrogenous animal matter; and more especially as urea has long been known to be capable of rapid alteration and decomposition under the influence of a ferment resembling yeast, or those derived from putrefying animal matters, like albumin. Urea ($\text{CH}_4\text{N}_2\text{O}$) is first changed under these circumstances by the addition of the elements of water to carbonic acid (CO_2) and ammonia (NH_3). In order to complete the oxidation the ammonia has

to be converted into nitric acid. This, as is well known, is effected by the action of a micro-organism, or of a series of such, and it is thus established that a typical excretory substance can be entirely destroyed by the aid of fermentative or allied action of minute organisms without any adventitious assistance. That non-nitrogenised substances, such as starch, can, by the life action of micro-organisms, be gradually oxidised and finally converted into carbonic acid and water is, of course, a matter of common knowledge. The problem therefore resolves itself into the question of how this natural method of oxidation may be best controlled and expedited.

In all methods of sewage purification which have been previously employed, the final oxidation has been effected by the agencies that have been alluded to, although this has failed to be generally recognised. The best and most natural system hitherto tried—namely, the application of sewage to land—depends for its success entirely upon the fostering and increase of micro-organisms. But the use of crude sewage upon land leads to great difficulties, and in consequence previous chemical precipitation has been resorted to. It has not been seen that the same agencies which destroy the dissolved impurities could, if given the necessary conditions, equally deal with those in suspension. Hence came all the numerous chemical schemes, with their inevitable accompaniment, sludge. With the clear effluent it was possible to deal, although the process being dependent so much upon local conditions and climatic influences, was always uncertain, but the sludge always remained, the bete noir of all those concerned in sewage disposal. In the recognition of the fact that all processes of sewage purification must be made subservient to the requirements of the various micro-organisms, lies the whole secret of success. All sterilising or antiseptic agents must be strictly excluded; a condition of neutrality or slight alkalinity must be maintained; oxygen, anyhow in the final stages, must be freely supplied; the temperature must be kept above the freezing point of water; and the amount of food must be proportioned to the powers of the organisms.

In the process of completely oxidising effete matters, two stages may be recognised in which distinct classes of organisms play their respective parts. The actual

identification of these organisms may be left for future discussion, it being sufficient for the present purpose to divide them into those that are able to break down and liquefy solid organic matter, and those that deal with it when in solution. It is not pretended that a clear line of demarcation can be established, although between the extremes of either class there are very distinct and clearly defined functional differences. The first-mentioned class may again be divided into two—viz., those that do their work in the presence of air, and those that thrive in its absence. Both of these are always present in ordinary sewage, and the predominance of one or the other is entirely in the hands of the sewage operator. If, as at Sutton, the first be employed, care is taken that oxygen shall have free access to every part of the culture medium; the beds are frequently entirely emptied to admit the air to every crevice; and the most successful work, hitherto, has been by working and resting intermittently. When, however, the anaerobians are employed, air is rigidly excluded; a fermentative action of a putrefactive character is encouraged, and the process is necessarily continuous. This is the method which has been adopted with such satisfactory results at Exeter. Into the relative merits of these two systems, aerobic and anaerobic, the authors do not propose to enquire; both are based upon scientific principles, both have been highly satisfactory in practice, and both remove, once and for all, the troubles of sludge disposal. The liquid organic matters are then subjected to the influence of micro-organisms which effect final oxidation, and this part of the process is the same whether the original breaking down of the solids be effected by aerobic or anaerobic means. Whether both processes can be successfully carried out in one operation remains to be shown; it is, however, probable that difficulties may be found, owing to the somewhat different conditions obtaining. As far as the results of working on these principles are concerned, the authors can confidently state, of their own practical knowledge, that firstly, no previous chemical treatment is required; secondly, no sludge is produced, thereby removing the chief difficulty hitherto met with; and thirdly, the quality of the final effluent can be controlled, admitting as it does, of being brought to any required degree of purity.

(To be Continued.)

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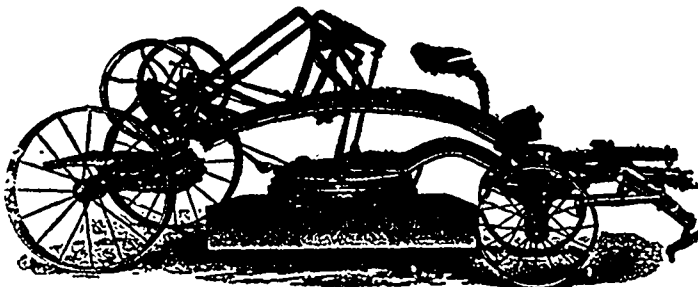
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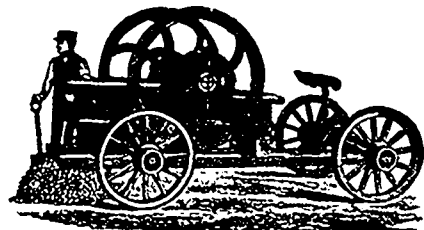
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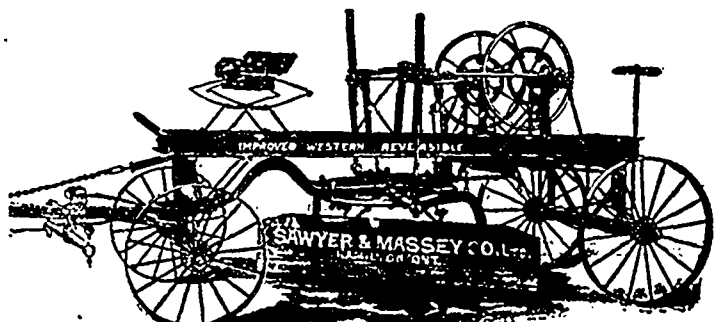
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