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CANADIAN CONTRACT RECORD

A WEEKLY JOURNAL

EVERY

PUBLIC WORKS • TENDERS
ADVANCE INFORMATION
AND MUNICIPAL PROGRESS

WEDNESDAY

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.

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Sealed tenders, addressed to the undersigned, and endorsed "Tender for Elevator Wharf Extension at Depot Harbour, Ont.," will be received at this office until FRIDAY, 22ND FEBRUARY, 1901, for the construction of an additional length to the Elevator Wharf at Depot Harbour, Muskoka District, Ontario. Plans and specifications can be seen at this Department at the offices of Mr. H. A. Gray, resident engineer, Confederation Life Building, Toronto; The Resident Engineer, Room 411, Merchants' Bank Building, St. James St., Montreal; Mr. Ph. Ireland, Clerk of Works, Post-Office, Quebec, and on application to the Postmaster at Parry Sound, Ont. Forms of tender can also be obtained at the above mentioned places.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

The contractor will be required to conform to regulations to be made by the Governor General in Council respecting the accommodation, medical treatment and sanitary protection of the working men employed on the work.

Each tender must be accompanied by an accepted cheque on a chartered bank, made payable to the order of the Honourable the Minister of Public Works, for twenty-five thousand dollars (\$25,000). The cheque will be forfeited if the party decline the contract or fail to complete the work contracted for. If the tender is not accepted, the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
JOS. R. ROY,
Acting Secretary.

Department of Public Works of Canada,
Ottawa, January 22nd, 1901.

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

TO STEEL BRIDGE BUILDERS AND MASONRY CONTRACTORS

Sealed tenders, endorsed "Tender for Substructure," will be received until SATURDAY, 7TH FEBRUARY 1901, for the construction of a wrought iron or steel bridge over the Nation River at St. Albert, Ont.

The bridge to consist of one span of 193 feet clear, with a roadway of 18 feet wide, clear, and to be proportioned to carry (in addition to its own weight) a moving load of 70 lbs. per square foot of floor area. Tenderers for the above work must furnish complete plans, strain sheets, specifications, &c., or their tenders will not be considered. As a guarantee of good faith each tender must be accompanied by an accepted cheque for \$250.00 in favor of Morris Shaver, Reeve of Cambridge Township. This cheque will be returned if the tender is not accepted. Sealed tenders will also be received for the abutments, of concrete and masonry, for the above superstructure, until the above mentioned date. Plans, specifications, &c., for the masonry can be seen after 31st January, 1901, at the office of Morris Shaver, Esq., Reeve. Tenders may be addressed to Morris Shaver, Esq., Reeve, South Indian, or to J. B. Sanche, Clerk, Meyersville, Ont.

Superstructure to be completed, ready for traffic not later than 15th September, 1901.

J. B. LEWIS,
Engineer in Charge.

CONTRACTS OPEN.

THAMESFORD, ONT.—Alex. Bain is preparing to build a new house.

WASHBURN, ONT.—A new house is about to be built by Wm. Murphy.

GLENCOE, ONT.—John Smith, butcher, is preparing to build a new house.

MALDEN, ONT.—A. W. Bailey contemplates building a new residence this year.

CHATSWORTH, ONT.—The Presbyterian congregation have decided to build a new manse.

GRANBY, QUE.—A new government building will be erected here during the coming summer.

PORT GREVILLE, N. S.—Elderkin & Co. intend building a large steamer for the Bay of Fundy trade.

HAMILTON, ONT.—Hoodless & Son contemplate making a large extension to their wood-working factory.

MIDLAND, ONT.—Plans have been prepared for a new Methodist church to be built this year, to cost \$8,000.

PENETANGUISHENE, ONT.—The council will expend the sum of \$3,000 in extending the waterworks system.

ALMONTE, ONT.—The council has decided to engage an expert to estimate the value of the electric light plant.

ST. STEPHEN, N.B.—McGibbon Bros., of Auburn, Me., have made a proposition to establish a shoe factory in this town.

PARRY SOUND, ONT.—W. T. Jennings, C.E., of Toronto, was in town last week surveying a route for a street car system.

ALVINSTON, ONT.—John McCallum invites tenders up to February 9th for construction of the Werden-McKellar drain.

PARIS, ONT.—The ratepayers will vote on a by-law to raise \$15,000 by debentures to purchase the electric light plant.

FORDWICH, ONT.—The Presbyterian congregation have decided to erect a new church on a site given by William Hamilton.

BIG, QUE.—A company is being formed to purchase the water power of Alf. Bouillion with a view to developing it electrically.

BENNINGTON, ONT.—Baker Bros., E. Kirk, and Alex. McCorquodale are each preparing to build new houses next summer.

QUEBEC, QUE.—Mr. Bernier has purchased a lot near Burroughs Terrace on which he will shortly commence the erection of a residence.

OAKVILLE, ONT.—The ratepayers will vote on a by-law on February 7th to raise \$7,000 by debentures for construction of granolithic sidewalks.

WINCHESTER, ONT.—The village council have appointed a committee to secure information regarding the building of granolithic walks.

WHITBY, ONT.—John Burns, secretary Building Committee, invites tenders up to February 15th for erection of manse for Presbyterian congregation.

GRAND FORKS, B.C.—It has been definitely announced that the proposed enlargement of the Granby smelter will be commenced about April 1st.

NELSON, B. C.—J. A. Sayward, lumberman, of Victoria, was in town recently in connection with the establishment of a large saw mill at this place.

MELANCTHON, ONT.—Tenders are desired by February 12th for building brick school house in section No. 12. Plans at William Hudd's, Hornings Mills.

SACKVILLE, N.B.—Senator Wood, H. A. Powell and H. C. Reid have been appointed a committee to take steps towards the construction of a waterworks system.

OSNABRUCK CENTRE, ONT.—Tenders are invited by Charles Burton up to Saturday, February 16th, for building a school house for school section No. 13, Osnabruk.

QUAMICHAN, B. C.—Rev. Father Van Goethen, of this place, has taken tenders for erection of church of St. Ann's at Cowichan; Thos. Hooper, of Vancouver, architect.

BRACONDALE, ONT.—The church of the Disciples have purchased property corner Helen avenue and Vaughan road on which to build a church as soon as spring opens.

DUNNVILLE, ONT.—The Niagara District, Wellandport & Dunnville Electric Railway Co. is seeking incorporation, to build an electric railway through the several municipalities.

CHATHAM, ONT.—The Kent Beet Sugar Co., with capital of \$500,000, is being organized here.—A local syndicate has applied to have the charter of the Chatham & Suburban Electric Railway Co. revived.

YARMOUTH, N. S.—The citizens are agitating for an electric light plant to be owned by the town.

CHARLOTTETOWN, P.E.I.—Tenders are invited by the Department of Public Works up to Friday, February 8th, for rebuilding Leslie's bridge at Souris West. Plans at the office of Hon. Thos. Kichham, Souris.

LEVIS, QUE.—The Levis Electric Railway Co. is seeking incorporation, to build an electric railway in this town and the adjoining counties of Levis, Dorchester and Bellechasse.

WIARION, ONT.—Bids are invited up to Saturday, 9th February, for purchase of \$5,000 twenty year 4 per cent. debentures. Particulars from William M'Ewan, Chairman Finance Committee.

ST. HYACINTHE, QUE.—Honore Gervais will apply to the provincial legislature for the incorporation of the St. Lawrence Southern Railway Co., to build a railway from Valleyfield to this town.

LEAMINGTON, ONT.—The Citizens' Electric Light Co. has been formed and a committee appointed to purchase a plant for municipal lighting. Dr. Hughes and W.D. Cox are provisional directors.

NEW DENVER, B. C.—It has been pointed out that there is a good opening here for a company to establish an electric plant to supply light and power to New Denver, Silverton, Three Forks and some of the mines.

BROCKVILLE, ONT.—The light commissioners have decided to postpone the question of improving the electric light plant until after the appointment of a manager therefor. This will likely take place in a few days.

SOUTH INDIAN, ONT.—Morris Shaver, of this place, will receive tenders up to February 9th for construction of two abutments of concrete and masonry and for approaches for a proposed bridge over the Nation river at St. Albert.

LISTOWEL, ONT.—At a public meeting held last week a resolution was carried in favor of submitting a by-law to the people authorizing a loan of \$10,000 to William Hess to assist him in establishing a chair factory in this town.

HULL, QUE.—The ratepayers of East Hull last week defeated the by-law authorizing the council to take \$2,500 of stock in the Alonzo Wright Bridge Co. The object of the company is to rebuild the Wright bridge over the Gatineau river.

KINGSTON, ONT.—The medical faculty of Queen's University have adopted the plan for adding another story to and remodelling the medical building, and have instructed Arthur Ellis, architect, to call for tenders for the work; estimated cost, \$10,500.

PETERBOROUGH, ONT.—The county councils of Peterborough and Victoria will probably take joint action towards building a bridge over the Burnt river, near Kinmount, in the township of Somerville. The government may also be asked to assist financially.

COATICOOK, QUE.—The Montreal Feather Co. have made a proposition to the town to take over the factory owned by the Dominion Cotton Mills Co. and put it in working order, at a cost of \$2,000, and install machinery for the manufacture of excelsior and feather goods.

DIGBY, N. S.—The Board of Trade will memorialize the Dominion Government to build a deep water wharf here.—W. B. Stewart will receive tenders, on behalf of the corporation, up to February 20th, for the construction of an alms house and insane asylum at Marshalltown.

ST. CATHARINES, ONT.—W. Shaw is about to rebuild the flour mill here which was burned recently.—The Niagara, St. Catharines and Toronto Railway Co.

have completed a survey for their westward extension towards Hamilton. The company also propose to build a spur line from Beamsville to Smithville, and will commence operations in the early spring.

ROCKLAND, ONT.—Tenders for building a Presbyterian church will be received by Dr. W. T. D. Ferguson up to February 2nd. Plans at office of Dr. Ferguson or J. P. McLaren, 104 Sparks street, Ottawa.

ST. JOHN, N.B.—The city engineer wants tenders by Friday, 1st February, for supply of 1,600 tons of hemlock timber.—Frank J. McPeake, superintendent Shore Line Railway, wants tenders for 50,000 railroad ties.—Plans have been completed for the new building of the Bell Telephone Company to be built on Chipman Hill, and the work of construction will be begun as soon as the weather is favorable.

COLLINGWOOD, ONT.—A by-law has been carried in council to raise \$4,600 for granolithic sidewalks.—The Mayor has received a communication from Charles D. Cramp asking that the site for the proposed smelter be placed at the disposal of the company as soon as possible. It is also stated to be the intention of the Cramp Co. to commence operations on the dock of an early date.

GODERICH, ONT.—The Mayor has suggested that preparations be made at once for the laying of granolithic walks during the current year.—The Maitland River Power Co., through James Clarke, president, has made a proposition to operate the waterworks and electric light plant. This company have in view the development of the power of the Maitland river, at an estimated cost of \$100,000.

TORONTO JUNCTION, ONT.—A special committee of the Public School Board has decided that a new school house should be erected this year; estimated cost, \$6,000.—The chairman of the Board of Works has recommended sewer extension along Annette street to Clendennan avenue, and the building of an overhead bridge over the railway at the foot of McMurray avenue.

ARNPRIOR, ONT.—The Government is calling for tenders for supply of timber to be used in construction of bridge, 300 feet long, at the head of Omho's, on the Madawaska river, situated between the municipalities of Raglan and Brudenell.—Work will likely be commenced in the spring on the building of the new Baptist church.—The town council has passed a resolution in favor of establishing a House of Refuge for the county.

MORDEN, MAN.—A company of Winnipeg capitalists has been formed to develop cement deposits in township 1, range 6 west. Plans for the plant will be laid before those interested at once. In connection with the works a railway will be built from the mine to this town. The Provincial Government has already surveyed a drain through the district. William Whyte, superintendent C. P. R., and Mr. Nanton, of Osler, Hammond & Nanton, are interested.

OTTAWA, ONT.—The county council have appointed a special committee to procure plans for a viaduct over the Richmond road, near Hintonburg.—The city council are considering the erection of an addition to the registry office.—R. B. Whyte has purchased the property on Rideau street at present occupied by H. H. Brennan & Co. It is understood to be his intention to rebuild his present premises in the spring.—P. McCann proposes building a residence on Bank street.—The proposed new departmental store to be built by T. Lindsay will be of brick and steel, and will cost about \$150,000.—Joseph R. Roy, Acting Secretary Department of Public Works,

invites bids up to Friday, February 15th, for construction of wharf at Boulardarie Centre, Victoria county, N. S. Plans at office of C. E. W. Dodwell, Halifax; E. G. Millidge, Antigonish, N. S.; on application to postmaster at Boulardarie Centre and at above department.

SHEDIAC, N. B.—As previously announced, it is proposed to build a railway connecting this town with Prince Edward Island, crossing the Northumberland straits. The line has been located from Shediac to about a mile beyond Avard's at Shemodue. There will be two bridges of about 100 feet span across the Aboushagan and Kouchibouguac rivers, and an arch across the Tidnish river. The construction will be commenced in the spring. A. P. Barnhill, of St. John, and Dr. E.A. Smith, of this place, are interested.

LONDON, ONT.—Herbert Matthews, architect, is preparing plans for the new Methodist church at Brownsville.—Moore & Henry, architects, have in hand the refitting of the offices of the Canada Life Insurance Co.—The London Loan premises are being enlarged.—The authorities of St. Andrew's Presbyterian church have decided upon the erection of a new Sunday school building costing \$15,000, and as soon as \$10,000 is subscribed work will be commenced.

VANCOUVER, B. C.—The congregation of St. Andrew's church are considering the question of providing increased accommodation. Particulars from F. R. Stewart or F. M. Cowperwaite.—The Board of Works have decided to call for tenders for a steam road roller of double cylinder type, 15 tons in weight, and for a stone crusher.—The Board of School Trustees at last meeting discussed the advisability of acquiring a tract of land to be used as a site for a college.—Plans have been prepared for a brick and stone building to be built on Carrall street, north of Hastings street, by Campbell Bros.

WELLAND, ONT.—The county council will memorialize the government to build a new bridge over the canal connecting east and west Main streets.—E. Morris, warden of the county, has pointed out that it will be necessary to rebuild three bridges, namely, Montrose, Beckett's, and O'Reilly's.—Mr. Pew has returned to town with plans for the steel plant to be established here, and states that work will be commenced immediately.—Robert Cooper, county clerk, writes that it is the intention of Welland county to build two bridges over the Welland river. Plans, specifications and tenders are asked for.

VICTORIA, B. C.—A syndicate, at the head of which is Captain John Irving, will apply for a charter for the construction of a railway across Graham Island, one of the Queen Charlotte group.—MacKenzie & Mann state that they will push the construction of the Coast-Kootenay railway without delay.—The British Columbia Electric Railway Co. will improve and extend their system this season.—The Provincial Government recently invited competitive plans for a new Government house. The judges last week selected for first place the design of Byrnes & Tait, of Victoria and Vancouver. The estimated cost of carrying out this design is \$46,000.

MONTREAL, QUE.—The Board of Trade have not reached a decision regarding the reconstruction of their building destroyed by fire last week.—The Finance Committee has granted an appropriation of \$7,000 for the continuation of the St. James st. sewer to Des Rivières street.—George Janin, Superintendent of the Water Department, has presented to council a statement of the requirements of his department. He asks for \$1,641,500, of which \$800,000 is required for replacing all the 4 and 6 inch water pipes by 8 inch pipes. Other items are: \$45,000 for a new electric pump; \$6,000 for im-

proving the intake; \$64,000 for the reservoir; \$400,000 for filtration purposes; \$30,000 for new hydrants; \$10,000 for new water mains; and \$1,000 for water meters.—Vincent Lacombe, architect, is preparing plans for a factory for C. Gullibert & Sons, St. Catherine street east.—Building permits have been issued as follows: Mrs. A. Dupenault, three storey house, 116 University street, cost \$7,500, (architects, Bernier & Brodeur); Chanteloup Mfg. Co., three storey warehouse, Cote street, cost \$10,000.

TORONTO, ONT.—It is announced that the Canada Life Assurance Co., who practically own the Princess theatre building on King street west, have agreed with the lessee to spend several thousand dollars during the coming summer in improving the building.—The Canadian Order of Foresters are considering a proposition to purchase Richmond Hall as headquarters for the Order, in the event of which the building will be entirely remodelled.—The Consumers' Gas Co. have applied to the city for permission to build a bridge across Parliament street connecting their buildings.—The Medical Health Officer has recommended the construction of a small crematory on the island to dispose of the garbage.—The city will shortly advertise for tenders for the following works: Asphalt pavements—Huron street, Cecil to College; Leopold street, Jameson to Dowling; Farley, Bathurst to Tecumseh. Macadam roadways—Brock street, Dundas to 1,000 feet south of Bloor; St. Joseph street, St. Vincent to 700 feet west; Isabella street, Yonge to Jarvis. Cedar block pavement—Alma avenue, Gladstone to Dufferin. Wood curbing—Wellington place, Spadina to Portland; Esther street, Queen to St. Patrick; Eden place, Bathurst to East End. Brick pavement—Piper street, York to east end. Brick walk—Sherbourne street, east side, Ancroft to South Drive. Concrete walks—Harbord street, north side, Robert to Borden; Charles street, north side, Yonge to Church; McCaul street, west side, Grange to St. Patrick; McCaul street, east side, Caer Howell to College; Baldwin street, south side, Beverley to Huron; Selby street, north side, Sherbourne to Huntley; Gerard street, north side, Berkeley to Ontario; Melbourne avenue, south side, Dufferin to Cowan; Oxford street, south side, Spadina to Augusta; Clinton street, east side, College to Harbord; Elmgrove avenue, east side, King to Queen; Simcoe street, east side, Adelaide to 62 ft. south; Spadina place, west side, Cecil to 214 ft. south; Queen street, south side, Massey to 45 feet west of Strachan avenue; Queen street, north side, Lansdowne avenue to 82 feet east; Howard street, north side, Glen road to Sherbourne; King street, north side, Bathurst to Niagara; Gerrard street, south side, Parliament to Sumach; Elm street, north side, Yonge to Terauley; Huron street, east side, Prince Arthur to Lowther; Queen street, north side, Grant to De Grassi; Gerrard street, south side, Sherbourne to Seaton; Carlton street, north side, Parliament to Sackville; Dunbar road, west side, Elm avenue to South Drive; Front street, south side, Church to West Market; Hayden street, north side, Church to Yonge; St. Vincent, both sides, Grosvenor to St. Joseph; Grosvenor street, north side, Yonge to St. Vincent; St. George street, west side, Bloor to Prince Arthur; Rose avenue, west side, St. James to Howard; Lowther avenue, north side, Walmer road to Brunswick; Oxford street, north side, Spadina to Augusta; Queen street, north side, John to 101 feet west; John street, west side, Queen to Grange; Elm street, north side, Terauley to Centre avenue.—Building permits have been granted as follows: William Moss, pair brick dwellings on Arthur street, near Sully, cost \$3,800; P. Roche, brick addition, 325 Queen street

west, cost \$2,500.—Ald. McMurrich will move in Council that a special committee be appointed to wait upon the Minister of Militia and urge that extra accommodation for the militia be provided in the armories.

FIRES.

Residence of G. W. Mullin at Picton, Ont., partially destroyed.—Dwelling at Brighton, Ont., owned by Mrs. William Coyle.—Woolen mills of Peter Inglis at Inglis Falls, 3 miles south of Owen Sound, Ont., totally destroyed.—Warehouses of J. Fennel & Son, hardware merchants, and the Masonic hall at Berlin, Ont., almost totally destroyed; loss \$40,000.—The Providence convent at La Prairie, near Montreal, totally destroyed; loss \$100,000.—Plant of the Duncan Lithograph Co. at Hamilton, Ont.; loss \$15,000.—A disastrous fire occurred in the city of Montreal on the 23rd inst., by which the block bounded by St. Sacrament, Commissioner, St. Nicholas, and McGill streets was almost totally destroyed by fire, including the Board of Trade building. Among the losses are: Laporte, Martin & Co., M. Saxe & Co., H. A. Nelson & Co., Davidson Manufacturing Co., Corticelli Silk Co., Duclos & Loseley, Silverman & Bolter, Seybold, Son & Co., and others. It is estimated that the loss will reach \$3,000,000. A second fire occurred a few days later, by which the cheese warehouses of D. A. McPherson, W. Johnston and Nicholas Pitt on William street were destroyed, the loss being about \$250,000.

CONTRACTS AWARDED.

LEAMINGTON, ONT.—The contract for construction of dock here has been let to Mr. Fluke, of Chatham, for \$27,750.

LEVIS, QUE.—Carrier, Laine & Co. have secured contract for building steel barge for the Montreal Transportation Co., cost \$80,000.

ELMIRA, ONT.—The tender of G. A. Simson & Co., of Toronto, has been accepted by the council for purchase of \$5,000 debentures; price \$4,951.

MONTREAL, QUE.—A. J. Cook, architect has let contracts for a house for J. H. Sheppard on Western ave. and Lansdowne street; Masonry and brickwork, McGarth & Sons; carpenter work, R. Neville, jr.; roofing, Geo. W. Reed; plumbing, J. H. Gardiner Bro.; plastering, H. Contant; electric wiring, H. Simon; steel work, Dominion Bridge Co.; painting, W. Rand.

PICTOU, N. S.—Following is a list of the bidders, with accepted tender, for material for waterworks for this town: Straight pipe—Montreal Pipe & Foundry Co., Londonderry, N.S. (accepted); U. S. Cast Iron Pipe & Foundry Co., Philadelphia, U.S.; Camden Iron Works, Camden, N. J. Special castings—Thos. A. McLean, Charlottetown, P. E. I. (accepted); The Brown Machine Co., New Glasgow, N. S.; Nova Scotia Cast Iron Pipe & Foundry Co.; Camden Iron Works; Montreal Pipe & Foundry Co.; Robt. Hannan & McDonald, Pictou, N.S. Gates and hydrants—The Rensselaer Mfg. Co., Troy, N.Y. (accepted for gates only); The Brown Machine Co. (accepted for hydrants only); Robt. Hannan & McDonald; Canada Foundry Co., Montreal; Coffin Valve Co., Neponset, Boston, Mass.; Drummond, McCall & Co., Montreal; Chapman Valve Co., Indian Orchard, Mass.; Thos. A. McLean; The Darling Pump Mfg. Co., Williamsport, Pa.; The Eddy Valve Co., Waterford, N. Y.; The Camden Iron Works. Pumping Machinery—The Smart-Eby Co., Hamilton, Ont. (accepted); Northey Co., Toronto, Ont.; John McDougall, Montreal; Stilwell-Bierce, Smith-Valle Co., Dayton, Ohio; The Bart Pump Co., Boston, Mass.; The Dean Pump Co.,

Holyoke, Mass. Boilers—Thos. A. McLean (accepted); The Robb Engineering Co., Amherst, N.S.; The Smart-Eby Co.; John McDougall. Stand Pipe—The Chicago Bridge & Iron Co., Chicago; E. Hodge & Co., East Boston; T. A. McLean, Charlottetown, P.E.I.; I. Matheson & Co., New Glasgow, N.S.; Cunningham Iron Works, Boston; John McDougall, Montreal; contract for stand pipe not yet awarded.

BLASTING.

(Continued from last issue.)

A few points of prime importance which should be observed are the following: First the strength and quantity of the explosive should be properly proportioned to the cohesive strength or resistance of the rock.

Second, the "burden," or line of least resistance (i. e., the shortest line that can be drawn from the charge in the bore-hole to the outer free face of the rock,) should bear a proper relation to the strength of the explosive and to the resistance of the rock.

Third, if the working face of the rock is so blasted as to leave two or more free faces instead of one for future blasts, the power required to overcome the resistance of the rock will be reduced, and explosives can be economized.

Fourth, a seam or fissure is a valuable aid in blasting if the hole is so located as to take advantage of this weakness, and, on the other hand, the power of the explosion be expended along such a seam without doing useful work if the hole is improperly located.

Fifth, breaking to regular benches and faces is more economical than irregular breaking, because the condition of the rock can be more carefully observed, admitting of a more intelligent placing of subsequent bore-holes, and it facilitates the handling and setting up of machine drills. It is also more convenient for work by hand drilling, in addition to which it keeps the mine in better condition for a complete and economical extraction of the ore.

Sixth, simultaneous firing is more economical in most cases than firing singly or in series, for the reason that the adjacent charges assist each other, reducing the amount of explosive required and the total length of holes to be drilled for any given volume of rock.

Seventh, careful charging, so as to secure as highly compacted a charge as possible, greatly increases the efficiency of the explosive.

Eighth, a well prepared primer, in the case of high explosives, is the key to a successful detonation of the charge, on which, other things being equal, its efficiency depends.

Ninth, the efficiency of all explosives, including high explosives, is dependent to a considerable extent upon the kind, length and degree of compactness of the tamping.

Tenth, the object of blasting in mines and quarries is to rupture rock so that it may be removed, not to hurl it to a distance, i. e., not to secure what military engineers call "ballistic" effect. Hence only enough explosive should be used to accomplish this. When fragments are thrown more than a few feet by a blast it is generally an evidence that the proper relation did not exist between the charge and the "burden" and that too large a charge was used for

the length of the line of least resistance.

In the accompanying illustration (Fig. 1) B N is the bore-hole; W L, measured from the centre of the charge in the shortest possible line to the free face, is the line of least resistance, or "burden;" M N is the charge in the bore-hole, which should be about 12 times as long as the diameter of the hole at its bottom; R S K is the outline of the new face which will be produced after the blast. The best results are obtained when the line of least resistance is perpendicular to the line of the bore-hole.

The line of least resistance must be shorter than the bore-hole, else the force of the explosion will expend itself in the direction of the bore-hole. If black powder is used in such a case the charge will blow out the tamping, producing a "pop-shot." If high explosives are used in this case the "crater," or funnel of rupture, will have very steep sides and a relatively small volume of rock will be ruptured.

The forces to be overcome vary with the kind of rock, the number and position of the free faces, and the direction of the blast. The direction of the blast is determined by the direction of the line of least resistance. If this is upwards the explosion must overcome the cohesion of the rock plus the weight of the volume of rock ruptured. If downwards, the explosion has to overcome only the cohesive strength of the rock. A somewhat smaller charge may consequently be used. For each individual shot this difference is trifling, but the aggregate is an important quantity in practical operations. The rupture of rock

in blastings is mainly accomplished by "shearing." The shearing strength of close grained granites varies from about 2,200 lb. to 2,900 lb. per square inch, and of marbles from 1,100 lb. to 1,600 lb. per square inch. As the total surface sheared by an ordinary blast is often as much as 73 square feet, or more, it will be seen how great is the difference in the resistance to be overcome in different cases, and that no mere "rule of thumb" method may be economically adopted for determining the charges. It is wasteful, and at best inaccurate, to continue experimenting unsystematically with different sizes of charges in any given rock to ascertain approximately the right one. It is better to go about it methodically. For this purpose it is necessary first to ascertain what is known as the "rock coefficient."

(To be continued next week.)

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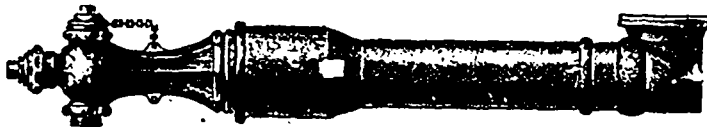
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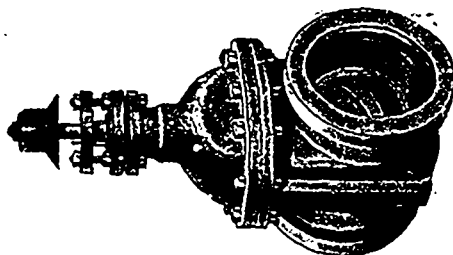
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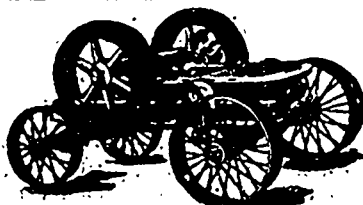
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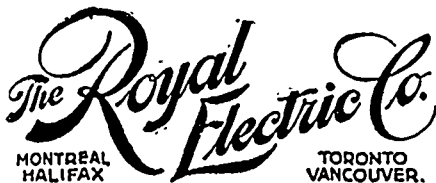
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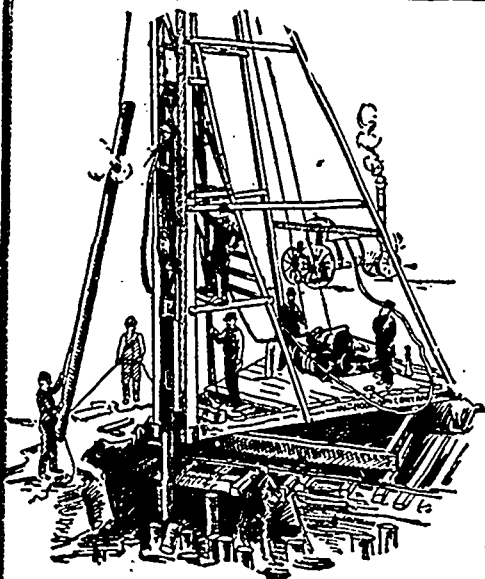
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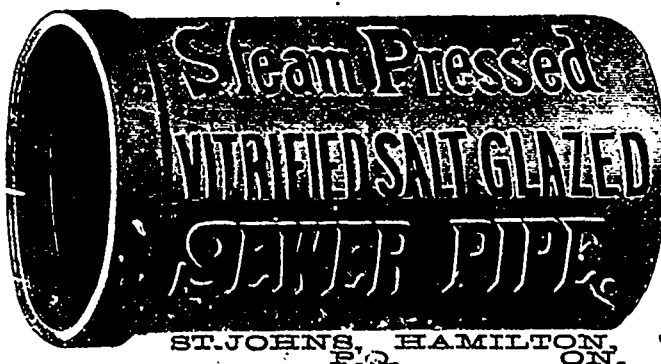
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PRESCOTT WATERWORKS AND SEWERAGE SYSTEM.

In a recent issue of the *CONTRACT RECORD* it was stated that the waterworks and sewerage systems of the town of Prescott, Ont., had been completed at a cost of \$87,500. This was somewhat misleading, as this figure did not include certain portions of the work, such as rock excavation, tank, etc. According to the statement of the waterworks commissioners the total cost of the completed systems was \$102,397.91. This does not include the sum expended for service connections, which up to the present time has been about \$1,150.

THE GOOD ROADS MOVEMENT.

A deputation composed of the Executive Committee of the Good Roads Association waited upon the Premier of Ontario recently in connection with the movement on foot to improve the public highways of the province. The following were the gentlemen that interviewed the Premier: J. E. Ramsden, C. E. Lundy and W. H. Pugsley, York Township; D. H. Moyer and J. F. Bean, Welland County; Thomas Buchanan, Oxford County; James Graham, Victoria County, and C. Richardson, Grey County. Mr. Bean was chairman and Mr. Ramsden secretary.

The proposition to the Government was that the cost of constructing the principal highways be borne by the Government, county and municipality through which the roads run, each of the three named to bear an equal share of the cost. As to the outlay necessary to cover the cost of maintaining the roads so constructed, the deputation suggested that the county provide the funds.

The Premier assured the deputation that the Government were anxious to do what they could in the matter, and that their suggestions would be taken into consideration.

The deputation, at a subsequent meeting, decided to send out circulars to the various municipalities in the province, to learn their views on the question.

ANNUAL MEETING OF CIVIL ENGINEERS.

The annual meeting of the Canadian Society of Civil Engineers opened in the new rooms of the society, 877 Dorchester street, Montreal, at 10.30 a.m. on Thursday, January 24th, Dr. H. P. Bovey, Dean of McGill University, presiding. At the morning session the report of the council for the year 1900 was presented and adopted. It showed a membership of eight honorary members, 318 members, 314 associate members, 38 associates, and 222 students, or 900 in all, an increase of 53 over last

year. The report of the convention at Ottawa from September 13 to 16 was also presented. In the afternoon Dr. Bovey delivered his presidential address on "The Place of Science in Education." He pointed out that the true function of science is to ascertain the causes of things and their relation to one another, and as such is a very valuable element in true education. For it gives an insight into our material environment and uncloses the sealed book of nature, while the methods of thought peculiar to it train our mental and moral faculties to meet the needs of the life we must lead. For the scientific method proceeds by observation, analysis, classification, generalization, deduction and experiment, and these must be used by us in a more less trained fashion every day.

The lecturer then quoted many illustrations of the remarkable results obtained by observation, analysis and experimentation by scientists, savages and others, and went on to point out that besides its practical advantages, the scientific method also teaches certain good moral virtues. Love of truth, humility and reverence, strenuous effort, are all inculcated by it.

Scientific methods, however, are not confined to the mere facts of nature. They may be and are now applied to the problems presented by history, language, literature and philosophy, [although their power is unable to produce the beauties of poetry or the triumphs of faith. Still in the teaching of science the application of its own methods produces results which can be obtained in no other way. For it is the best known method of study, and as such should be studied in itself; it trains the eye, the ear and the hand; it encourages concentration of mind and the close grasp of facts; it emphasizes the relations of cause and effect; it involves the study and accumulation of facts, and offers a free scope for the exercise of the human powers, and lastly, it fits a man more directly for his career in life than any other course. Surely then science should be taught to every one.

In concluding his interesting paper Dr. Bovey said that science, besides its great function in the training of the mind, has accomplished marvellous victories for the good, moral and intellectual, as well as mental of mankind. If we look forward to a new century as remarkable for its invention as the last, let us remember that these inventions must be won with the same weapons as those of our forefathers, and strive to emulate the patience and determination of Darwin, the resourcefulness of Stephenson, and the reverent humility of Faraday.

At the morning session on Friday a discussion arose upon the question of engineers holding salaried appointments under the municipal authorities and taking outside work at lower rates of remuneration than those current in the profession. The matter was referred to a special committee for consideration.

The following officers were elected for the year 1901: President, Mr. E. H. Keating, Toronto; vice-presidents, Messrs. G. H. Duggan and E. Marceau, Montreal, and Mr. C. H. Rust, Toronto; treasurer, Mr. H. Irwin, Montreal; secretary, Professor C. H. McLeod, Montreal; librarian, Mr. E. A. Rhys Roberts, Montreal. Council—Messrs. John Kennedy, Montreal; W. P. Anderson, Ottawa; G. H. Mountain, Ottawa; D. MacPherson, Montreal; P. S. Archibald, Moncton, N. B.; H. J. Campbell, Vancouver, B.C.; W. R. Butler, Kingston; J. Galbraith, Toronto; J. Ross, Montreal; H. S. Poole, Halifax; R. B. Rogers, Peterboro; R. Herring, New York; W. Chipman, Toronto; C. B. Smith, Toronto; B. D. Connel, Montreal.

A resolution of sympathy with the King and Royal family was adopted and ordered to be forwarded to the Governor-General. The members then visited McGill University and were shown the scientific building by the professors.

The meeting closed by a luncheon at the Society's rooms, tendered by the resident members.

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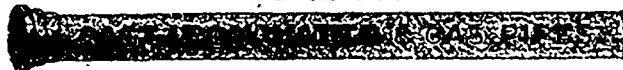
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