

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. 18.

TORONTO, MONTREAL—SEPTEMBER 25, 1907—WINNIPEG, VANCOUVER

No. 30

THE CANADIAN CONTRACT RECORD

PUBLISHED EVERY WEDNESDAY

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of Advertisers,
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FOR SALE

One, 7 x 12, double cylinder double drum Beatty hoisting engine in first class condition; one Beatty swinging gear, also irons and timbers complete for large derrick, size, 14 inches.
THE CADWELL SAND & GRAVEL CO.,
Windsor, Ont.

Pumping Engine For Sale

The City of Calgary invite tenders for a second hand "Brown" Pumping Engine in fair condition l.o.b. Calgary.

The pump has a capacity of 700,000 gallons in 24 hours.

Tenders to be addressed to the City Clerk, Calgary, Alta., and endorsed "Tender for Pumping Engine".
R. E. SPEAKMAN,
City Engineer.

City Hall, Calgary, September 2, 1907.

Debentures for Sale

Village of Elmira

Sealed tenders will be received by the undersigned up to 8 o'clock P.M. on MONDAY, THE 7TH DAY OF OCTOBER, 1907, for the purchase of \$7,500.00 4% per cent. Debentures, payable in twelve years, re loan to the "Elmira Interior Woodwork Company, Limited."

Particulars from undersigned.
No tender necessarily accepted.

J. H. RUPPEL, Clerk.

DEBENTURES FOR SALE

TOWN OF BRACEBRIDGE

Sealed tenders (marked "Tender for Debentures") will be received by the undersigned up to WEDNESDAY, OCTOBER 31ST, 1907, for following Debentures of the Town of Bracebridge:

\$4,000 Public School, 20 years.
10,000 Waterworks Improvement, 30 years.
7,000 Street Improvements, 20 years.

Payable in equal annual instalments of Principal and Interest.

Particulars can be had from
ALEX. C. SALMON,
Town Clerk,
Bracebridge.

Notice to Contractors

ASPHALT PLANT

Sealed tenders, addressed to James Davidson, Chairman of the Board of Works Committee, will be received by registered post only at the office of the City Engineer up to 3 P.M., WEDNESDAY, OCTOBER 16TH, 1907, endorsed, "Tender for an Asphalt and Bituminous Paving Plant," for the supply and erection of same on a site to be provided by the Corporation.

Specifications, forms of tender and full particulars may be obtained at the City Engineer's office, City Hall.

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

NEWTON J. KER,
City Engineer
Ottawa, September 16, 1907.

FOR SALE

2 Cableways, 750 feet span, and 20 three-yard Steel Skips, all practically as good as new. Apply

M. L. QUILLINAN,
Imperial Bank Chambers,
Niagara Falls, Ont.

12-INCH PIPE SEWER

Tenders will be received by the undersigned up to 7 P.M. ON SATURDAY, THE 5TH OCTOBER, 1907, for building a Sewer on Jackes Avenue and Yonge Street.

Specifications, etc., can be examined at the York Township Hall, 108 Victoria Street, in Confederation Life Building, Toronto. Any tender not necessarily accepted

P. S. GIBSONS & SONS,
York Township Engineers,

Willowdale,
21st September, 1907.

CONTRACTS OPEN.

MOOSOMIN, SASK. — Plans are being submitted to the Government for the erection of a \$6,000 armoury.

BERLIN, ONT. — A brick building, to be used as a furniture factory, is to be erected here by Zuelsdorf Bros.

HAMIOTA, MAN. — James Andrew wants bids up to September 30th for \$4,000 6 per cent. 10 year debentures.

WATERDOWN, ONT. — The estimate of J. F. Archer, County Engineer, for the proposed subway amounted to \$8,880.

NIAGARA FALLS, ONT. — The Ontario and Municipal Board have approved of the issue of \$11,910 5 per cent. 20 year waterworks debentures.

CUPAR, SASK. — John Hubbs, Secretary-Treasurer, wants tenders up to October 1st for \$5,500 eight per cent. twenty year school district debentures.

COLLINGWOOD, ONT. — A by-law to raise \$4,000 by debentures for waterworks extensions will shortly be submitted for the approval of the Ontario Municipal Board.

VERNON, B. C. — William Henderson, the architect of the Dominion Public Works, Victoria, was recently in the city inspecting the proposed site for the new post office.

MOOSE JAW, SASK. — Votes of the ratepayers will be taken on October 7th upon a by-law to raise \$92,000 by debentures for extensions to the electric lighting system.

LEDUC, ALTA. — Tenders are invited by C. E. A. Simonds up to October 1st for the following debentures: Fire protection, \$10,000; public park, \$5,000; 5 per cent. 20 years.

DIDSBURY, ALTA. — Tenders will be taken until October 1st by the Secretary-Treasurer, N. Eby, for \$5,500 fire apparatus and \$1,000 street improvement 6 per cent. 20 year debentures.

WELLAND, ONT. — J. H. Crow, Secretary, Trustee Board, invites tenders up to September 30th for rebuilding the Welland Methodist Church. Plans at

offices of J. R. Wilson, architect, Cooper Block.

BRACEBRIDGE, ONT.—A bylaw will be submitted to the ratepayers on October 14th to raise \$5,500 by debentures for granolithic sidewalk construction and \$10,415 to repay the Bank of Ottawa loan.

HULL, QUE.—At a special meeting of the City Council it was decided to borrow the sum of \$15,000 for the erection of a new fire station and the renovation of the electric plant. The station will cost about \$5,000.

ST. CATHARINES, ONT.—We understand that the Coca Cola Co. of Toronto are contemplating the erection of a bottling works in this city. C. A. Matson, the Toronto manager, was recently here making investigations.

HALIFAX, N. S.—H. E. Gates, architect, has just taken tenders for the erection of a laundry building on Buckingham and Albemarle streets.—Plans are being prepared for alterations to the Eastern Trust Co.'s premises on Follis street.

SOUTH BAY, N. B.—James Lowell, M. P. P., has offered a site at a nominal figure to the Canada Woodenware Co. whose factory at Hampton was recently burnt out. The St. John Board of Trade are behind the concern and it is most probable that the company will locate here.

BRANDON, MAN.—The City have made arrangements with the C. P. R. for the joint bearing of the expenses of the First street bridge. The C. P. R. Chief Engineer, James Switzer, favors construction of steel and reinforced concrete, but nothing has been definitely decided as to these details.

MOSSY RIVER, MAN.—D. F. Wilson, Secretary-Treasurer, will receive tenders up to October 10th for the construction of a bridge across the Mossy river near Winnipegosis and also for two bridges across the Fork river. Plans at office of Chief Engineer, Government Buildings, Winnipeg, and with Mr. Wilson, of Fork river.

OWEN SOUND, ONT.—We understand that plans have been prepared for the new Ben Allen Portland Cement Mill and that the work of construction will be undertaken as soon as possible.—Votes of the ratepayers will be taken on October 7th on a bylaw to loan \$30,000 to Shortells Limited, who agree to expend \$40,000 upon factory buildings and plant.

SELMA, N. S.—Tenders will be received up to October 12th by Fred. Gelinus, Secretary, Department of Public Works, Ottawa, for the construction of a block and span wharf at this place. Specifications at offices of C. E. W. Dodwell, Resident Engineer, Halifax; E. G. Millidge, Resident Engineer, Antigonish, and with the Local Postmaster.

LION'S HEAD, ONT.—Tenders will be received up to October 18th by Fred. Gelinus, Secretary, Department of Public Works, Ottawa, for building an extension to the wharf. Specifications of J. G. Sing, Resident Engineer, Confederation Life Building, Toronto; H. J. Lamb, Resident Engineer, London, Ont.; with the Department at Ottawa, and with the local Postmaster.

WETASKIWIN, ALTA.—Tenders will be received by John Stocks, Deputy Minister of Public Works, Edmonton, up to October 3rd for the completion of the Court House. Further particulars on application to the engineering branch of the Department of Public Works, Edmonton, and at the offices of the Department, Calgary. Separate tenders must

be submitted for the plumbing and heating.

NEW WESTMINSTER, B. C.—Plans have been submitted by the Great Northern Railway for the erection of a \$50,000 brick and stone station on the site of their present depot. There is also some talk of building an elevator.—The property in the vicinity of the Great Northern & C. P. R. Railway yards has been lately purchased by a Vancouver company for the establishment of a large industry, the exact nature of which has not yet been disclosed.

ST. JOHN, N. B.—The effects of the F. B. Dunn Packing Co., Ltd., which will be sold by auction on September 28th include a 15 horse power engine, a 30 horse power boiler and other machinery.—It was stated by Director Murdoch at a meeting of the Water & Sewerage Board held a short time ago, that fully five miles of new pipe would be needed for repairs when the full pressure was put upon the pipes.—Owing to a miscalculation of the C. P. R. engineer it has transpired that only 19,000 yards of dredging will be necessary at Sand Point instead of 33,000.

EDMONTON, ALTA.—It is reported that an offer has been made to the Council by P. Cronin, of Toronto, on behalf of George Balfour, a prominent English contractor and engineer, for the purchase of the street railway system.—Property has been acquired on Victoria and Sixteenth streets by R. Lemarchand, who proposes to erect a \$40,000 apartment house thereon next spring.—Plans are being prepared by William Fingland, of Winnipeg, for the new Parliament Buildings, and the contract will probably be let this fall.—A new Baptist church will shortly be erected on the corner of Syndicate avenue and Morris street.—The Salvation Army are contemplating the erection of a building on Fraser avenue.—It is reported that the cost of the Y.M.C.A. building for which the May Sharpe Construction Co. recently secured the contract, will approximate \$90,000.

VICTORIA, B. C.—F. C. Winkler has appealed to the Council to reverse the decision of the Building Inspector who refused him a permit to erect an oil warehouse on Coffin Island. The matter is still in abeyance.—In reply to a letter recently sent by Commissioner Raynor on behalf of the Council asking for a figure for the purchase of their concern, the Esquimalt Waterworks Co. have named a price of \$1,382,000.—The Streets, Bridges & Sewers Committee have recommended the expenditure of \$1,500 for drainage work on Garbally road.—The tenders received for the Victoria West school were considerably above the estimate, and were consequently refused.—A deputation from the New Westminster Council is negotiating with the Provincial Government here for the erection of a steel bridge across the north arm of the river to Lulu Island.—Building permits have been issued as follows: Andrew Cox, one-storey frame dwelling, Government street, \$3,300; George Brooke, frame dwelling, Rudlin street, \$1,600; M. Cameron, one-storey brick dwelling, Vining street, \$1,300.

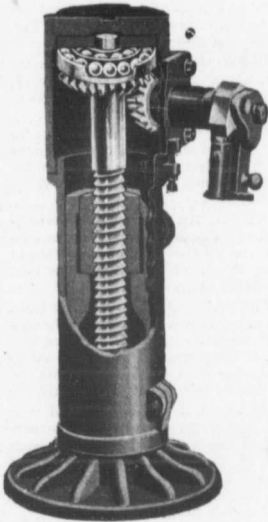
OTTAWA, ONT.—A movement is on foot among the people of the Diocese of Pembroke to erect a large addition to the Pembroke General Hospital as a mark of commemoration of Bishop Lorrain's Episcopal jubilee.—The Finance Committee are considering the installation of a relief sewer in the central area of the city and a sub-committee has been appointed to take the matter up. The estimated cost of the proposed work is \$28,000.—Fred Gelinus, Secretary, De-

partment of Public Works, invites tenders as follows: Up to October 4th for the construction of Quarters for Married N. C. officers and men at Winnipeg. Plans with J. Greenfield, Dominion Public Works office, Winnipeg, and at offices of the Department; up to October 12th for the construction of a block and span wharf at Selma, N. S. Specifications at office of C. E. W. Dodwell, Resident Engineer, Halifax; E. G. Millidge, Resident Engineer, Antigonish, with the Local Postmaster, and at the Department; and up to October 18th for the construction of an extension to the wharf at Lion's Head, Ont; plans at office of J. G. Sing, Resident Engineer, Confederation Life Building, Toronto; on application to the postmaster at Lion's Head; and at the department.

WINNIPEG, MAN.—Notice is given of the Council's intention to effect various local improvements, including the following: Sidewalk construction on Pine street, Vicar street, Alexander avenue, Church avenue, Carruthers avenue and Ross avenue, total estimated cost, \$6,000; macadam pavement, neighborhood of Royal and Rose streets, \$770; asphalt paving, Reitta street and Tecumseh street, estimated cost, \$11,500; granolithic walks, Maralin street, Good street, Alexander avenue, Argyle street and Portage avenue, total estimated cost, \$8,000; sewer construction, Ida avenue, Renton street and Redwood avenue, \$5,000.—The committee have recommended other extensive works in local improvements for the approval of the Council, and tenders will likely be taken in the near future.—Fred. Gelinus, Department of Public Works, Ottawa, invites tenders up to October 4th for the construction of quarters for married N. C. officers and men. Plans may be seen at Dominion Public Works' Office and at the Department, Ottawa.—M. Peterson, Chairman, Board of Control, wants tenders up to October 2nd for the construction of various local improvements including granolithic walks, sewers and pavements. Specifications at City Engineer's office.—Announcement is made by M. Peterson, Secretary, Board of Control, that the civic electric plant at the Board of Works pumping station is offered for sale. Apparatus includes 100 h.p. Leonard-Ball automatic tandem compound engine.—A permit has been taken out by the Salem Reform church for the erection of a building on the corner of Burrows and Andrew streets. D. Gislason has secured a permit for two houses on Home street, to cost \$6,000, and the city, a permit for a store house on Tecumseh street, to cost \$6,550.

VANCOUVER, B. C.—In connection with the Coughlan structural steel project, the City Engineer has approved the plans for a factory building 60 feet x 120 feet.—M. A. Archer, a prominent ironmaster of Birmingham England, and a director of the Central Iron & Steel Corporation of that city, has been making investigations in this province with a view to the establishment of an iron plant.—According to a report from Montreal, the C. P. R. will shortly commence the building of a line across Vancouver Island from Nanaimo to Alberly.—The Horticultural Society have appointed a committee to make arrangements for the erection of a \$3,000 building on the Society's grounds at 21st street.—Building permits have been issued as follows: Laundry building for St. Paul's hospital, Burrard street, \$6,000; Vancouver Construction Co., Salisbury Drive, \$3,500; Dr. F. T. Underhill, alterations, Barclay street, \$2,000; C. A. Gustafson, Davie street, \$4,500; E. Yeo, Fifth avenue, \$1,600; C. D. Bemrose, Point Grey Road,

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frame dwelling, \$6,000; McNaul'y & Riddle, 13th street, frame dwelling, \$2,000; H. W. Dagget, frame dwelling, Salisbury drive, \$1,800; J. Morrow, frame dwelling, 16th avenue, \$1,400; A. Handy, frame dwelling, \$3,200; A. T. Ingram, frame dwelling, Barnard street, \$2,000; Peter Duffy, frame dwelling, Charles street, \$2,000; C. W. Haywood, frame dwelling, Keefer street, \$2,000; James Morton, frame dwelling, Cordova street, \$2,000; J. W. Scott, frame dwelling, 8th street, \$2,000; A. M. Creary, frame dwelling, Seventh avenue, \$2,400; M. T. Easterbrook, frame dwelling, Seventh avenue, \$1,500; A. Towner, frame dwelling, Harris street, \$1,200; George Leighton, pair of concrete dwellings, Spruce street, \$3,000; Samuel Paynter, brick dwelling, Besser street, \$1,400; W. J. Bates, frame dwelling, Comox street, \$2,400; Montgomery & Patterson, framedwelling, Westminster avenue, \$2,500; Little & Brown, frame dwelling, Alberta street, \$1200; Merchants Bank alterations, Carrall street, \$16,000; J. Gilott, frame dwelling, Robson street, \$2,500; Savage & Bilton, frame apartment building, Richard street, \$13,500; G. B. Baker, frame dwelling, Carolina street, \$1,900—By-laws to raise \$300,000 for sewerage works, \$100,000 for road improvements and \$45,000 for school buildings have recently been passed.

TORONTO, ONT.—It has been decided to expend \$50,000 in the building of a wing for the Home for Incurables.—A site has been purchased on Atlantic avenue by the Laidlaw-Watson Shoe Co., of Aylmer, Ont., who will shortly spend something like \$35,000 in factory building and machinery plant.—J. R. Beamish, of the Beamish Shaving Parlors, has acquired property at the corner of Jarvis and Maitland streets, upon which he will erect an \$8,000 residence.—The Court of Appeal has endorsed the decision of the Railway Committee of the Privy Council that the

C.P.R. and G.T.R. must bear the entire cost of building and maintaining the Yonge street bridge.—The Chairman of the Board of Control, Mayor Coatsworth, invites tenders up to October 1st for the erection of a band stand at Island Park. Plans at office of Commissioner of Parks, City Hall.—Recent building permits include:—Laidlaw Watson Shoe Co., 2-storey brick factory, Atlantic avenue, \$12,000; C. W. Chadwick, 1 pair semi-detached 2-storey roughcast dwellings, brick fronts, Dufferin Street, \$3,400; Church of Redeemer, 2-storey brick Sunday school, Avenue road, \$10,000; C. W. Chadwick, 3 attached 2-storey roughcast dwellings, brick fronts, Brock avenue, \$5,000; John McKay, 1 pair 2-storey roughcast dwellings, Pape avenue, \$4,000; J. McDermott, 1 pair 2-storey brick stores, Queen street east, \$5,600; C. J. Stanton, 2-storey brick dwelling, Maitland street, \$4,500; W. B. Charlton, 3-detached 2½-storey brick dwellings, Oakland avenue, \$6,500; Wm. Downes, 1 pair semi-detached 2-storey brick dwellings, Crawford street, \$4,000; W. J. Grant, 2½-storey brick dwelling, Pearson avenue, \$3,200; R. P. Cowell, 1 pair semi detached 2-storey brick stores, corner Bloor street and Montrose avenue, \$5,000; Wm. Eacrett, 1 pair 2-storey frame stores, corner Queen street east, \$2,000; The Y.W.C.A., alterations to Y.W.C.A. building, Simcoe street, \$12,000; J. H. McKay, 1 pair semi-detached 2-storey & attic brick dwellings, Bartlett avenue, \$3,000; T. Wilkins, 2-storey brick dwelling, Rosedale, \$6,500; H. Galbraith, 2 pair semi-detached 2-storey and attic brick dwellings, Grace street, \$9,000; W. Barrett, 2-storey brick store and dwelling, corner Yarmouth road and Clinton street, \$2,500; W. & R. Morrow, 1 pair semi-detached 2-storey roughcast dwellings, brick fronts, Russett avenue, \$3,000; H. C. Blatchford, 2½-storey brick dwelling, Hawthorne avenue, \$4,000; Mrs. Thomas Walker, 2-storey brick

dwelling, Howard Park avenue, \$3,500; C. Gambia, 2½-storey brick building, Poplar Plains road, \$7,000; P. Gillelan, 2-storey and attic brick dwelling, Callendar street, \$3,000; Love Bros., Limited, 2-storey brick veneer front and roughcast dwelling, Riverdale avenue, \$2,000.

CONTRACTS AWARDED.

SELKIRK, MAN.—The authorities have awarded the contract for the new public building to S. Brown at \$24,000

VICTORIA, B.C.—The Department of Public Works have awarded the contract for the building of two scows to Wm. Turpel & Sons, of this city, at \$36,000.

PETERBORO, ONT.—Contractor Proctor, who is building the new armoury, has given an order for a million bricks to the Sandstone Brick Co. of this town.

CALGARY, ALTA.—The contract for the new \$25,000 warehouse of the Mooney Biscuit & Candy Co., Ltd., to be erected on Eighth avenue, has been let to W. J. Richards.

BRANDON, MAN.—The Great Northern Railway Co. have awarded the contract for the erection of their new freight sheds to R. M. Willoughby; the cost approximates \$12,000.

MONTREAL, QUE.—The contract for the construction of the five mile conduit has been let to P. M. McGovern of Boston, at \$684,000. It was proposed to undertake the work by day labor, but the Council finally rejected this proposition.

HALIFAX, N.S.—It is reported that the contract for the erection of the new Church of England Cathedral has been let to M. S. Brookfield, Limited, at about \$125,000.—The work of extending the College street building has been let to Walter Lownds at \$3,800.

WINNIPEG, MAN.—No tenders were received for the building of the engine and boiler house at the waterworks, and the City Engineer has been ordered to proceed with the work according to his tender of \$18,221.—The Board of Control



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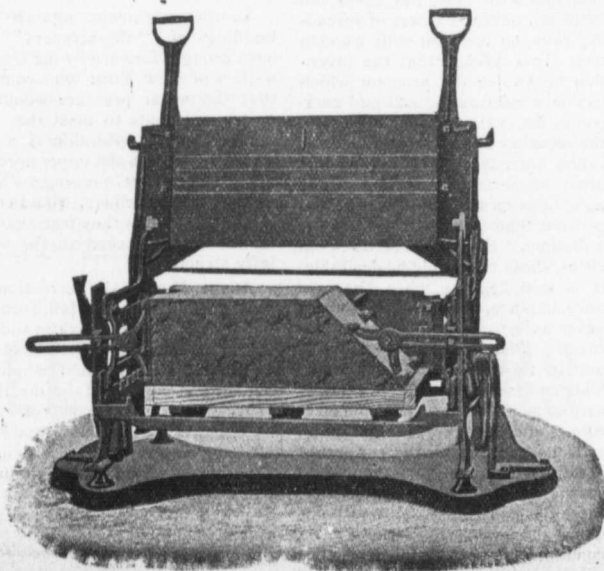
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MONTREAL.

have recommended the acceptance of the following tenders in connection with the Pointe du Bois power development: One second-hand 38-ton standard gauge "Baldwin" Logal locomotive, Mussels Limited, Winnipeg, at \$3,600; construction of wooden Howe truss bridge across the Winnipeg river, Buchanan & Co., \$44,127; reconstruction of Redwood avenue bridge, Kelly Bros. & Co., \$29,461; metal lockers for new police station, Schmidt & Co., \$1,351; installation of electric light and fixtures for new police station, McDonald-Wilson Lighting Co., \$630.

TORONTO ONT.—The Orpen Contracting Co. have secured the contract for the proposed sewer from Queen street to G.T.R. tracks at \$22,950. The City Engineer also tendered at \$27,000.—In connection with the new 3-storey Strand Hotel to be erected on Richmond & Victoria streets, Architect Simpson, of 17 Toronto street, has awarded the contract for the masonry work to J. Clarkson & Son.—The following contracts have been let by the Board of Control:—Asphalt pavements: Brock, Bloor to north end, Godson Contracting Co., \$4,842; Aberdeen avenue, Parliament 44 feet west, Constructing and Paving Co., \$1,450; Clinton street, Bloor to Barton, Godson Contracting Co., \$1,788; Elliott street, Broadview to Bolton, Barber Asphalt Paving Co., \$4,044; Jordan, King to Wellington, Constructing and Paving Co., \$1,357; Manning avenue, Bloor to north end, Constructing and Paving Co., \$13,974; Russell avenue, Bloor 987 feet north, Godson Contracting Co., \$3,773; Mansfield, Manning to Clinton, Engineer, \$1,896; Castle Frank, Hawthorne to Dale, Engineer, \$5,700. Macadam: Hogarth, Broadview to Logan, City Engineer, \$15,395. Concrete: Lane, first south of Queen, between Bathurst and Tecumseh, City Engineer, \$1,650. Vitrified block: Don Esplanade, Queen to Mary, City Engineer, \$9,507. Concrete walks: Dovercourt place, Salem avenue to Bartlett, Dominion Concrete Co., \$1,19½ per lineal foot; Dufferin street, Lindsay avenue to Muir, Grant Co., \$1.17; Brookfield avenue, from Queen to Humbert, City Engineer, 72c; Elmer avenue, from Queen to north city limit, Gardner Co., \$1.04; James street, Albert 151 feet north, Dominion Concrete Co., 90c; Roxborough street, from Yonge to Cluny avenue, Dominion Concrete Co., \$1.19; Regent street, from Wilton to Sydenham, both sides, Gardner Co., \$1.15; Jersey avenue, from Evans to north end, Constructing and Paving Co., 98c; Markham, from Herrick to Lennox, Excelsior Co., 75c; Dupont, from Bedford to Davenport, Crescent Paving Co., 74c; Garnet avenue, from Shaw to Miles avenue, Crescent Co., 74c. The City Engineer has been awarded following sidewalk contracts: Bathurst, Nassau to Rosebery avenue, 86c; Bathurst, Wolsley street to St. Patrick, 86c; Buchanan, Yonge to Teraulay, 80c; Brookfield, Queen to Humbert, 72c; Caer-Howell, Simcoe to University avenue, 86c; Fern, Sorauren to Roncesvalles, 72c; Sorauren, Dundas 137 feet north, 72c.

FIRES.

Buildings and machinery of the New Brunswick Railway & Machine Co. Gibson, N. B., loss \$75,000.—Buildings of Queen's Hotel, Pulford's drug store, I. McKinley and W. Reid, at Lacombe, Alta., heavy loss.—Buildings of Tess & Persse, paper manufacturers, and John Robertson & Co., distillers, loss, including stock, \$60,000.—Buildings and plant of the Inter-West Peat Fuel Co., Lac du Bonnet, Man., loss \$40,000.—Saw mill and building of the Albert Lumber Co., Barabois, Que. Building and machinery of the Quebec Manufacturing Co., Penetanguishene, Ont., estimated loss, \$8,000.—Planing mill of Wm. Grader, Chatham, Ont., loss \$40,000.

EXPANSION AND CONTRACTION IN CONCRETE STRUCTURES.

A paper by Mr. A. C. Lewerenz, M. Am. Soc. C. E., containing some notes on concrete and reinforced concrete retaining walls at the United States Navy Yard, Puget Sound, is deserving of study as the subject of expansion joints in structures of the kind has never been exhaustively investigated, and many practical engineers are not entirely convinced as to the efficacy of such joints. In the case of a solid concrete wall built some four years ago, Mr. Lewerenz states that the expansion joints provided all appear to be active, opening as much as 3/16 in. Across the top of the wall many fine cracks, sufficiently wide to admit the blade of a pocket-knife, and 2 in. to 3 in. deep, have appeared at intervals of about 6 ft. apart. It is interesting to compare these results with the record concerning a reinforced concrete wall with a thin face slab, and buttresses at intervals. This wall, over 1,200 ft. long, was built last summer without expansion joints, as it was considered that the reinforcement would prevent serious cracking of the concrete. The anticipation has been fulfilled, for careful examination shows the only effect of exposure to the sun at low tide during the day, and to the cold water at high tide during the night, has been the formation of very fine surface cracks across.

A CONCRETE RAILWAY TIE.

Concrete plays an important part in a new invention in railroad ties, on which Harry J. Correll, of Mt. Jewett, Pa., has secured patents. Concrete blocks connected by forged steel bars and securely bolted to the rails, make up the principal feature of the ties. It is said that with these ties there can never be a case of spreading rails, so common with wooden ties. It is claimed that the invention may solve the problem which has been confronting railroad companies for years and which refers to the securing of wooden ties, owing to the scarcity of suitable oak and other timber. It is said that the new tie is practically no more expensive than wood and will last for a lifetime. For street car tracks in cities, these ties would be desirable, it is said, because when they are once in place, the pavement would never have to be torn up to replace them. Each sleeper is approximately thirty inches long, twelve wide and twelve thick, and if necessary to guard against possible fracture, could be reinforced with metal rods laid in the blocks. Another feature which is said to appeal to railroad contractors, is the fact that these ties can be made at any point along the line of road where little concrete block work could be set up.

BRICKS FROM GARBAGE.

The system of refuse destruction in some of the English cities is beyond criticism. The money derived from the material in many instances more than covers the cost of collection and reduction, and, in addition to this, heat, light and power are supplied for municipal purposes. A notable instance is at Nottingham, England, where a third incinerator is about to be erected which will be much larger than the two existing plants. In that city one of the by-products of the plants is bricks for paving or building. The clinkers from the furnace are mixed with cement and under hydraulic pressure formed into blocks which are said to be harder and more enduring than rock itself.

USE OF PEAT IN BRICK-MAKING.

In Germany they are mixing coal and peat, making a compressed mixture, which has been used as a fuel in a brickyard with a result so favorable that it will no doubt open a new field for the use of peat fuel in brick manufacture. In the neighborhood of Jevers, Oldenburg, an excellent heavy blue clay is found, which was considered suitable for the manufacture of hard clay bricks. All efforts to manufacture such bricks from this clay proved unsuccessful until a mixture of one part of peat and ten parts of coal was tried as fuel. The result was a hard, brown brick, instead of the light red brick which was produced formerly. The experiments were repeated until at last a first class brick was produced.

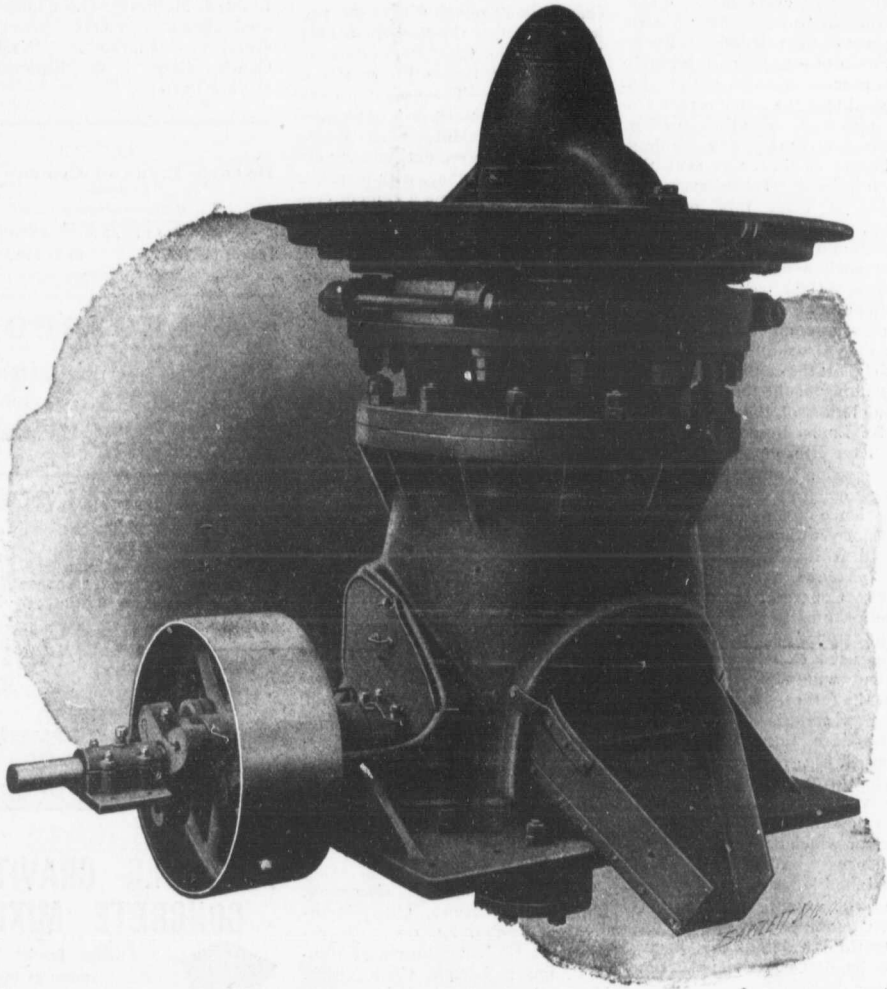
NOTES.

The Raven Lake Portland Cement Company, Limited, of Raven Lake, Ont., have assigned to H. R. Morton, Toronto.

Another argument against the building of "sky-scrapers" has been brought forward by the Underwriters of New York who contend that the water pressure would be quite inadequate to meet the exigencies of the situation if a fire broke out on the upper floors of any of their big buildings. Such an event, they believe, would entail enormous loss, as they fear that the flames would spread to the other lofty structures.

At the Municipal Convention recently held in the City Hall, Toronto, Dr. Morley Wickett gave an address upon "Municipal Statistics and Debentures" showing that municipal debentures increased in the three years ending December 31st, 1906, by \$35,000,000 against a total issue of \$26,700,000 by the Provincial Governments, and that the municipal debts of Canada amount to \$150,000,000 against a total provincial indebtedness of \$100,000,000.

Rock Crushing Plants



The demand for crushed rock is increasing rapidly for railroad ballast, Portland cement, fluxing purposes in smelting plants, "Good Roads," etc. Bulletin 1411 describes the machinery and appliances, including the Gates "K" gyratory breaker shown above, used in MODERN ROCK CRUSHING Plants. Included also are sectional plans of a large number of plants in active operation, from which intending purchasers may get valuable hints in preparing data for plans and specifications.

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CARELESSNESS IN CONCRETE CONSTRUCTION.

Richard L. Humphrey, president of the National Association of Cement Users, has examined many of the cases of collapse of concrete construction and pronounces his opinion that in every instance the fall of the structure has been due to carelessness of construction. From observation of other concrete buildings in process of construction, he is satisfied that the same errors are being repeated and that further collapses will surely come unless the officials of the cities take the question in hand. He believes that in order to meet this problem squarely, every city in the United States should revise its building laws in such a manner that either the owner or the contractor of a concrete building shall be compelled to employ a competent inspector whose duty it shall be to follow every detail of the construction from the beginning of the foundations to the completion of the roof. New York, St. Louis, Boston and Philadelphia have either prepared or are now preparing new regulations governing concrete construction.

The science of concrete construction is not yet thoroughly settled, and until it is, the greatest care should be taken in the use of the material. Concrete, by reason of its superior qualities, especially its resistance to fire and its cheapness, is being used extensively in these days, and will be employed still more in the future. It is a comparatively new material, and until its properties are fully known and appreciated, the greatest safeguards should be thrown about it. There is a prevalent idea that it can be used by unskilled laborers. That is the error which has led to serious consequences. While it is true that unskilled labor can be employed to a large extent, concrete construction requires the same care and attention to details that is demanded by first-class construction with other materials.

Each failure tends to discourage the use of concrete, for the reason that it is almost universally attributed to the material rather than to the improper conditions under which it is used. The failure of a reinforced concrete structure by reason of improper design, poor materials or bad workmanship is no more an argument against its use than the collapse of a steel structure under similar conditions is an argument against the use of structural steel in construction.

Building permits issued during the current year at Edmonton, Alta., up to August 28th, total \$2,027,375.

The building permits issued at Prince Albert, Sask., during the month of August, amount to \$20,492.

THE MANUFACTURE OF CEMENT.

The following extract setting forth some of the features in cement manufacture that go to produce the most desirable article, is culled from an Owen Sound exchange in connection with the projected plant of the Ben Allen Portland Cement Co.: "Grinding is, however, not the only requisite of good cement. The proper proportion must be obtained in mixing the different ingredients. Lime is the chief active ingredient, and experience has shown that, within certain limits, the more lime a cement contains the greater is its strength. But if more lime is present than can chemically combine with the other ingredients, the cement after setting will blow and disintegrate. A thoroughly-washed, well burned and finely ground composition will bear with safety a much higher percentage of lime than one made from the same raw materials which have been badly incorporated, insufficiently washed imperfectly burned, and coarsely ground.

Experts have found that an ideal cement is represented by the formula:—

Lime (per cent.) equals 2.8 per cent. silica plus 1.1 per cent. alumina. To the layman this may be more clearly expressed by saying that three parts lime to one part silica is a sound cement; $3\frac{1}{2}$ lime to 1 silica is unsound; 2 parts lime to 1 part alumina is sound, while $2\frac{1}{2}$ lime to 1 alumina is unsound. (The marl furnishes the lime, the clay gives the silica and alumina, with a proportion of iron oxide."

NEW COMPANIES.

Montreal Packing Company, Limited, St. Cesaire, Que., incorporated, capital \$20,000. Incorporators, H. Lamontagne, of Montreal, and P. Leclair, Chas. Grise, Henry Grise and A. Grise, all of St. Cesaire.

Canadian Thermos Bottle Company, Montreal, Que., incorporated, capital \$300,000. Incorporators, John Schwabacher, G. MacDougall, L. McFarlane, Chas. Pope, and A. Swindlehurst, all of Montreal.

Ideal Smoke Consumer Company, Limited, Montreal, Que., incorporated, capital \$49,000. Incorporators, J. Labadie, O. Papineau, L. Demers, A. Deguire, Montreal, and P. Bernard, of Longue Pointe, Que.

The Calkins Tile & Mosaic Company, Limited, Montreal, Que., incorporated, capital \$20,000. Incorporators, W. J. Henderson, A. L. Smith, J. W. Hannah, A. C. Calder and John W. Graham, all of Montreal.

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minals, Limited, Toronto, Ont., incorporated, capital \$2,000,000. Incorporators, Gerard Ruel, A. J. Mitchell, J. W. Robertson, R. P. Ormsby, F. C. Annesley and Lorne Mitchell, all of Toronto.

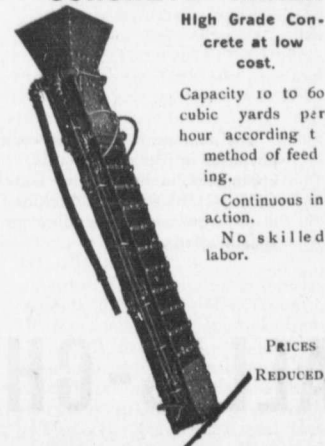
Montreal Engineering Company, Limited, Montreal, Que., incorporated, capital \$100,000. Incorporators, F. C. Clarke, A. J. Nesbitt, Charles Giles, I. W. Killam and Horace Porter.

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THE MODERN APARTMENT HOUSE.

According to the New York Tribune, despite the fact that nearly \$30,000,000 has been expended this year on the erection of apartment houses in the United States capital, the demand is always far ahead of the supply. It is pointed out that the secret of the increasing popularity of these structures lies in the able manner in which the architects and builders are catering for the public taste. With their comfortable suites of airy commodious rooms, with their fireproof construction, and with their model systems of heating, lighting, ventilation and plumbing—to which must be added in most cases the conveniences of elevators and telephones, it is small wonder that the modern apartment house is luring city people away from the old style

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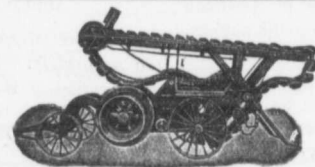


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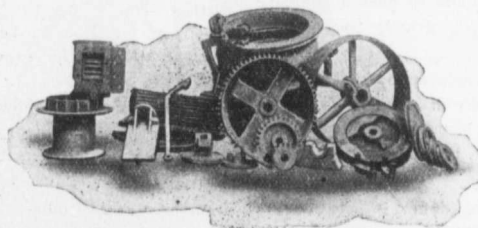
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SOME NOTES ON THE SPECIFIC GRAVITY OF PORTLAND CEMENT*

By RICHARD K. MEADE AND LESTER C. HAWK.

In the report of Committee C "On Standard Specifications for Cement," made to our Society in 1904, under the heading, "General Observations," appeared this paragraph.

"Specific gravity is useful in detecting adulteration and underburning. The results of tests of specific gravity are not necessarily conclusive as an indication of the quality of a cement, but when in combination with the results of other tests may afford valuable indications."

Shortly after the publication of this report, one of the writers was approached by a city engineer, who stated that he did not care for a certain cement because on two occasions when he had obtained samples of this brand they had proved to be of a low specific gravity, and he believed that this cement was not as hard burned as other brands.

This remark started the hearer on a series of experiments, which have extended over a period of nearly three years, to determine the causes which lead to low specific gravity in Portland cement, and the actual value of the test. In the meantime the committee on Technical Research of the Association of American Portland Cement Manufacturers took up the subject, and its two reports will be found in several technical journals. Butler, an English chemist, also made experiments along the same line, which he described in the proceedings of the Institute of Civil Engineers.

Naturally, the first condition to receive attention was the degree of burning. This was done in the following manner. A kiln was detected "cold," as we call it, or not hot enough to burn the mixture properly, and from this kiln twelve samples were drawn as the kiln was heated up to slightly above normal temperature. From these samples four were selected as representing (1) very soft underburned clinker, (2) slightly underburned clinker, (3) normally burned clinker and (4) very hard burned clinker. These clinkers were then rapidly ground to pass a standard 100-mesh sieve and the specific gravity was at once taken.

The need of haste was occasioned by the fact that the underburned clinker rapidly absorbs carbon dioxide and water from the air, which lowers its specific gravity. The specific gravity of the four samples was found to be:

- | | |
|--|-------|
| 1. Very soft underburned clinker | 3.208 |
| 2. Slightly underburned clinker | 3.222 |
| 3. Normally burned clinker | 3.214 |
| 4. Very hard-burned clinker | 3.234 |

The ground clinker was also mixed with 2 per cent. plaster of paris and made into pats, which were subjected to the steam test. At the end of two hours, the pat made from the very soft underburned clinker had entirely disintegrated. At the end of five hours, the pat from the slightly underburned clinker had become checked and partially disintegrated. The other two pats stood the steam test satisfactorily, and also five hours longer in boiling water had no effect upon them.

* Read before the American Society for Testing Materials, Atlantic City, N. J., June 21, 1907.

In this experiment, we have four samples of clinker all burned by the same kiln from the same lot of raw material, one of which was so poor as to fail after only a short period in steam, while two were sufficiently well burned to stand perfectly the steam and boiling tests, yet the extreme difference in specific gravity between the four was only 0.026. We have frequently taken the specific gravity of underburned clinker and in no case have we ever found it below that of the standard specifications. The experiments made by the members of the Association of American Portland Cement Manufacturers, conducted at six different mills, gave an average of 3.14 for the specific gravity of the underburned cements and 3.18 for that of the hardburned. A sample of raw material being ignited merely sufficiently to drive off the carbon dioxide without any appreciable clinkering, had a specific gravity of 2.996. It would therefore be possible to make a mixture of half and half of this partially burned raw material and well-burned Portland cement clinker which would pass standard specifications, so far as specific gravity is concerned.

ADULTERATION AND ITS EFFECTS.

The effect of adulteration can of course be calculated accurately. The substances most available for adulteration of Portland cements in this country are natural cement, raw material, or limestone and slag. Rosendale, or natural cement, has probably been used more than any of the others. Its specific gravity ranges between 2.8 and 3.1. In detecting a mixture of Rosendale cement and Portland, the value of the test will depend entirely upon the specific gravity of the Rosendale. In the case of a natural cement with a specific gravity of 2.9, it would, of course, be possible to mix as much as 1 part of Rosendale to 2 parts of Portland, while with natural cements of higher density more Rosendale could be used.

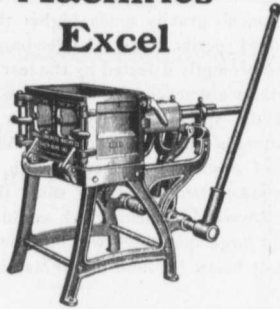
The raw material, or cement rock of the Lehigh district, has a specific gravity of about 2.7, hence very little of it could be used without appreciably lowering the specific gravity. Its dark color would also cause its presence to be suspected and chemical analysis would readily detect it. Limestones average in specific gravity about 2.8, so that only about 20 per cent of the mixture could be used without lowering the specific gravity below that called for by the standard specifications.

In the case of blast furnace slag, the density of which is somewhere around 3.0, large quantities could be used without detection by the specific gravity test. The writer recently had a sample of basic slag containing 36 per cent silica, of which the specific gravity was 3.05. A mixture of one part of this slag and one part of Portland had a density of 3.12.

STORAGE LOWERS THE SPECIFIC GRAVITY.

It has long been known that the storage of cement causes a lowering of its specific gravity. This is easily explained by the fact that cements on exposure to air absorb carbon dioxide and water, forming calcium carbonate and calcium hydroxide. The former has a

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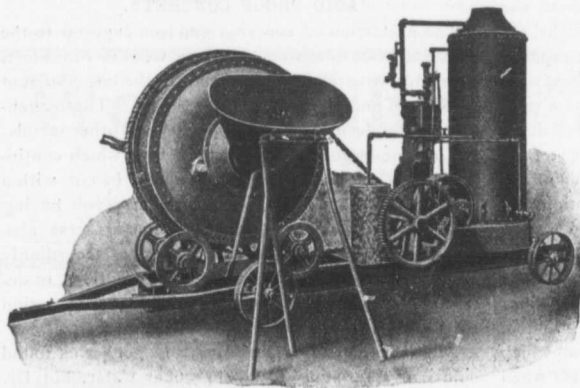
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density of 2.70 and the latter of 2.08. The effect of storage on cement is shown by the following :

Sample No.	—Specific Gravity—				
	1	2	3	4	5
When made	3.19	3.21	3.16	3.15	3.20
After 28 days	3.11	3.12	3.10	3.09	2.08
After 6 months	3.08	3.04	3.08	3.03	3.04

It is now generally conceded that the "seasoning" of cement is an advantage and many tests made by various operators prove that cement shows its best strength after a storage of from three to six months. Yet it is probable that cement which has been stored this length of time will have a specific gravity of less than 3.10. If the cement does not absorb some carbon dioxide and water, no benefits will be derived from seasoning, and if it does absorb them the specific gravity is bound to be lowered thereby. The absorption of 3 per cent carbon dioxide and water is sufficient to lower the specific gravity of cement below 3.10.

An under-burned cement which failed when freshly made to stand a five hours' steam test without complete disintegration had a specific gravity of 3.185. After being seasoned one month, it stood 5 hours' steam and boiling tests perfectly, but its specific gravity had fallen to 3.082 only.

With the problem of manufacturing large quantities of Portland cement economically to meet the increased demands for building materials, has come the practice of storing cement clinker. This can be done out of doors at a much smaller cost than it is possible to store cement in a warehouse. This clinker also grinds much more easily and allows the manufacturer to give the engineer a finer product for the same money than could originally be done. It has been found, however, that such clinker makes a cement of lower specific gravity than would have been the case if the clinker had been ground fresh from the kilns. Otherwise, the cement is excellent. For example, a sample of clinker fresh from the coolers gave a specific gravity of 3.18; after being exposed out of doors for one month the specific gravity fell to 3.04, and after two months' exposure to 2.96. The cement made from the exposed clinker had a neat strength of 677 lbs. at the end of 7 days and 765 lbs. at the end of 28 days, and a sand strength of 330 lbs. in 7 days and 394 lbs. in 28 days.

It will be seen, therefore, that seasoning or storage of the cement has a much greater effect upon the specific gravity than underburning or adulteration.

It has been proposed in cases in which the specific gravity of cement falls below the limit prescribed by the specifications that the sample should be ignited and the specific gravity of the ignited sample taken. We have made a larger number of determinations of specific gravity upon seasoned cements, from which we find that practically all samples of cement when ignited gives a specific gravity of between 3.15 and 3.22 and that most of them give around 3.20. This conclusion was also reached by the Committee on Technical Research of the Association of American Portland Cement Manufacturers, and by Butler.

Upon igniting a mixture of 40 per cent Rosendale and 60 per cent Portland cement, having a specific gravity of 2.985 before ignition, we were surprised to obtain a specific gravity of 3.30. This result was checked, with practically the same result.

A mixture of 40 per cent cement rock and 60 per cent Portland cement, which had a specific gravity of

2.95, gave after ignition 3.20. This would prove that the ignition of the cement and the determination of the specific gravity of the ignited sample fail to give any indication of adulteration, even where this has taken place to a considerable extent.

CONCLUSIONS.

(1) That the specific gravity test is of no value whatever in detecting under-burning, as under-burned cement will show a specific gravity much higher than that set by the standard specifications. Under-burned cement is readily and promptly detected by the test for soundness and no others are needed for this purpose.

(2) The value of the specific gravity test as an indicator of adulteration is much exaggerated. While a large admixture of any light adulterant with the cement would be shown, there is at the same time much slag and also Rosendale cement which could be mixed with cement in large quantities without lowering the specific gravity below the limit of our standard specifications.

(3) That low specific gravity is usually caused by seasoning the cement or the clinker, either of which improves the product.

(4) That the proposition to ignite the cement sample which falls below specifications and determine the specific gravity upon the ignited portion is of no value because adulterated cements also have their specific gravity very much raised by such ignition.

(5) That the requirements for specific gravity should be omitted from the standard specifications, or at least that the clause which infers that low specific gravity is caused by under-burning and adulteration should be omitted, and that in its place one should be inserted, stating that low specific gravity may, but does not necessarily imply, adulteration, as it is in most cases due to seasoning of the cement or storage of the clinker before grinding, both of which are beneficial to the product.

ACID PROOF CONCRETE.

The protection of concrete and iron exposed to the action of water drawn from driven wells in Frankfort, Germany, is necessary on account of the large amount of oxygen and free acids in the supply. These agencies have a destructive effect on iron and other metals, the iron undergoing a softening change which continues to such a point that it can finally be cut with a knife. The concrete walls of a large reservoir having a dense surface coat of cement mortar were also attacked by this water, and the department accordingly undertook an elaborate series of investigations to determine the degree of protection against such action afforded by various compounds on the market.

After experimenting for some time none was found sufficiently resisting to this peculiar water, but Dr. Karl Roth, the chemist engaged on the investigation, devised a compound which gave much more satisfaction, lasting without apparent injury long after other substances had completely failed. The success of this compound has led to its being placed on the market under the name of "Inertol" by Paul Lechler, of Stuttgart. The concrete is best rubbed off with felt disks rather than steel trowels, and must be perfectly dry and preferably warmed before the inertol is applied. The latter should be given an opportunity to dry thoroughly before water is allowed to come in contact with it, for otherwise the water will acquire the odor of carbolic acid and consequently be spoiled for drinking purposes.—Engineering Record.

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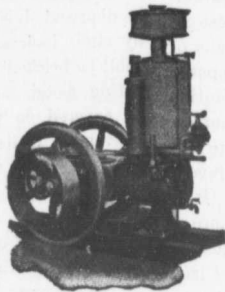
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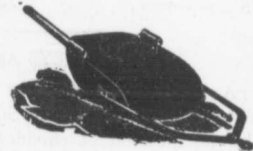


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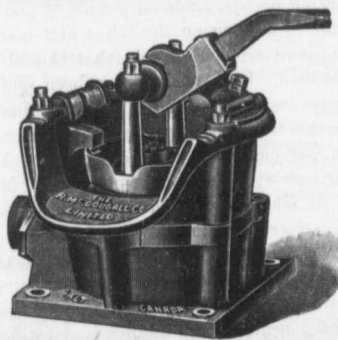
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A NEW THEORY OF CORROSION.

At a recent meeting of the American Society of Testing Materials, Dr. Cushman of the United States Department of Agriculture, brought forward some novel views relative to the causes of the corrosion of iron and steel. It has been generally recognized hitherto that water, oxygen, and an acid (usually carbonic acid) were responsible for corrosion, and that in the absence of any one of these substances, little rusting would take place. A short time ago it was found by Mr. Moody that in the absence of carbonic acid gas, or other acid, no corrosion could occur. Dr. Cushman goes a step further by showing that the first attack is made on iron by hydrogen in the form of an exchange of the electrostatic relations between the metal and the hydrogen. His investigations were extended to an inquiry into the means of preventing corrosion so caused, the remedy proposed being the treatment of iron and steel by a solution of an oxidizing agent, such as bichromate of potash, the effect of which is to polarize the metal to the condition of an oxygen electrode, and thus to prevent the approach or attack of the hydrogen ion. It is stated that the polarization thereby effected is more or less lasting, but it cannot be sufficiently so to justify reliance upon the process for the preservation of iron and steel in ordinary constructive practice. Although we are not yet within measurable distance of non-corrosive iron and steel, the results quoted certainly encourage the hope that methods of treatment far more efficacious than mere painting may be evolved in due course.

CHIMNEYS AND FLUES.

A special committee of the National Fire Protection Association of the United States, appointed to consider the question of chimneys and flues, reports in general terms and not in the customary draft clauses for a building code. The committee thinks that all heat-conveying flues should be free from all contact with inflammable materials, should have a free ventilating space surrounding them, should be securely built and supported, should be so placed that they can be readily reached so as to clean them off on the tops; the distance from inflammable materials is to a great extent dependent upon the construction of the flue, the temperature of the heat passing through it and the continuous length of time the heat is passing through.

In all chimneys and flues of brick construction, only good, hard, well-burnt brick should be used; soft brick should be prohibited; all joints should be struck smooth on inside, excepting where the flue is lined with well-burnt clay or terra cotta pipe; no pargeing mortar shall be used on the inside; for bake ovens, low pressure boilers and similar purposes, the brickwork shall be at least eight inches thick and lined continuously on the inside with well-burnt clay or terra cotta pipe and capped with terra cotta, stone or cast iron; for high pressure boilers the brickwork shall not be less than twelve inches thick with the inside four inches of this wall built up of firebrick laid in fire mortar for a distance of twenty-five feet in any direction from the source of heat; for smelting furnaces, steam boilers or other apparatus which

heat the flues to a high temperature, shall be built with double walls of suitable thickness for the temperature, with an air space between the walls, the inside four inches to be of firebrick laid in fire mortar for a distance of not less than twenty-five feet in any direction from the source of heat. All other chimney flues shall be lined continuously on the inside with well-burnt clay or terra cotta pipe made smooth on inside from the bottom of the flue or throat of the fire-place if the flue starts from the latter; chimneys not in continual use, or in dwellings from fireplaces or stoves, need not be lined, but must be struck smooth on inside. It is not advisable to have any bends or curves requiring a smaller upward inclination than seventy-five degrees, and all curves and bends are to be deprecated. No flue should be less than eight inches by eight inches. All unused flue holes in chimneys shall be bricked up, or closed with permanent tightly-fitting metal covers. Horizontal brick flues should be covered on their tops with neat cement.—“Improvement Bulletin.”

REDUCING THE COST OF CONCRETE CONSTRUCTION.

The various improvements which are taking place from time to time in all branches and departments of the concrete industry, the infusion of new ideas, and the more effective execution of old ones, are bringing both initial and ultimate costs lower and lower each year. Conditions, which at present obtain, warrant placing the estimate for a concrete structure at a figure nearly identical with that of heavy timber mill construction.

Within the last ten years improvements in the method of manufacturing and handling of cement have reduced the price of this essential some 50 per cent. For analogous reasons, namely, recent improvements in crushing machinery, the hardest of stone can be broken and crushed at an expenditure much less than the process of a few years ago necessitated.

It will be noted in this connection that contractors, whose work has been such as to make for success, are constantly so systematizing their work as to benefit future construction from past experience. Wooden forms have always proved a large factor in the cost of concrete buildings. In order to reduce the cost of such forms, in so far as may be consistent with proper execution of the work involved, the Frank B. Gilbreth organization has instituted the practice of constructing working models, made on a scale of one-eighth inch to the inch, showing the latest and best practice, and the most economical jobs that this organization has erected. Such models have been sent to a new job to be inspected, together with a notice that prizes up to \$25 would be given to the workman offering such suggestions as may cut down the cost and labor on materials; make for greater speed in constructing or in taking down forms, prolong the life of forms, thus increasing the salvage at the completion of the given job; or permit forms to be taken down with the least possible jar to setting concrete.

The last item in particular is of especial importance and has often been neglected by engineers devoting their efforts in full or in part to work along reinforced concrete lines.

Such a method has also been found to give the bene-

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fit to this contractor's organization of the ideas of all the form-builders who have been at any time in the employ of other contractors. Incidentally, it affords the further benefit of an intelligent interpretation of local conditions by local carpenters.

The latter factor often completely upsets the most economical ideas in forms designed in another part of the country, because of the impossibility of getting form lumber in the usual standard sizes.

EXTENSIBILITY OF CONCRETE.

Anomalous extensibility of concrete when reinforced has again been studied experimentally by Prof. C. Bach, of Stuttgart. The assertion of A. Considere, that concrete when reinforced is capable of undergoing without rupture elongations many times as great as the ultimate elongation of plain concrete, was attacked experimentally and disproven simultaneously in America and in Germany. Prof. F. E. Turneure and Prof. A. N. Talbot, independently in this country, and Mr. Kleinogel in Germany, showed that the assertion is untenable. Experiments made in the Royal Testing Institution of Berlin showed even a slightly lower rupture-elongation for reinforced than for plain concrete. On the other hand, Considere in a check series of tests found reason to reaffirm his "law," and Prof. Schule, of Zurich, also supported it. Prof. Bach therefore believed that further experiments were justified. The "waterline" method of Prof. Turneure (also used by Kleinogel and by Feret) was used to give a test of when local disintegration appeared; and, as Prof. Bach rightly argues, such disintegration in the tension side of a beam represents the tension failure of the concrete, since the smallest crack forming in a tension test-piece would immediately cause shifting and concentration of stress, bringing about instant rupture. The results showed the following unit elongations:—

5 plain tension specimens	0.000065—0.000090
68 plain and reinf. beams000060—0.000100
4 plain tension specimens000080—0.000100
21 reinforced beams000090—0.000100

These figures, in the case of the beams, are not by any means identical with the elongations at which the first crack could be detected, but are elongations at which water spots on the tension face appeared. The first perceptible crack appeared at .000080 to 0.000125 for plain beams, and 0.000100 to 0.000367 for reinforced beams. The last-named value, which is about four times as great as the elongation at the first water spot, was obtained from a beam, reinforced with a slotted sheet of metal, adapted to give maximum distribution of steel in the concrete. There is a large difference in elongation at first crack, between a beam seasoned in air and one seasoned in water, the contraction of the concrete in the first case causing an initial tension which leads to earlier cracking. Thus, of four identical beams, two were seasoned in air and two in water; the former began cracking at 0.000097, while the water-seasoned beams averaged 0.000205. Prof. Bach concludes: "Concrete in itself has the same extensibility when reinforced as when not reinforced." The development of actual cracks, of course, may be retarded by various causes until a considerably greater elongation is reached than corresponds to the appear-

ance of water spots, but the cracks are not the true criterion of tension failure. The results of Prof. Bach's experiments are given by him in the "Zeitschrift des Vereines Deutscher Ingenieure" of June 29, 1907.

RUBBER PAVING.

Probably no substance is adapted to a greater variety of uses than rubber, but its applications are restricted by the limited supply and high cost. Among the purposes for which it has great advantages but is not likely to be extensively employed is that of paving roadways. A rubber pavement laid at a London railway station in 1881 was in 1902 worn down to five-eighths of an inch in its thinnest place. Notwithstanding the scarcity of the material, the cost was less than three times as great as that of wood, and its life has been more than twenty years instead of the four years which the wood or asphalt would have endured.

ARCHITECTS OPPOSE CONCRETE SCHOOLS.

The Committee on Property of the Board of Education of Philadelphia, Pa., has been given the opinions of well-known architects regarding the feasibility of concrete construction for the city schoolhouses and the advisability of the city building schools of the fireproof type only. William T. Tilden, chairman of the committee, in making his report stated the committee had made an exhaustive survey of the subject from different points of view, and had not only secured the opinions of skilled architects in the city of Philadelphia, but had also visited with skilled architects in Boston and New York City. The conclusions to which the committee had come were that the increased expense of fireproof buildings justified itself by the superior results obtained. Architects as a whole were in agreement that the use of reinforced concrete for public structures of this character was as yet too much in the experimental stage to warrant the risk of using it alone as a building material. Architects were unanimous in stating that in the present state of reinforced concrete work most unusual care has to be exercised in mixing the concrete, care requiring expert inspection to watch every stage of the work, to see that the connection is properly made between one day's work with that of another and that it is properly put in place in the course of construction. The correspondence carried on by the committee showed that with the expensive inspection no money can be saved by this style of construction, while at the same time chances would be that an unsatisfactory and unsafe building might be the result. The committee's investigative work will therefore give Philadelphia assurance of fireproof school structures regardless of initial cost.

An order-in-council has been passed at Ottawa with a view of more effectively furthering the purpose of the fair wages resolution, providing that contractors shall post in a conspicuous place on the public works under construction the schedule of wages inserted in their contracts for the protection of the workmen employed. Contractors will also have to keep a record of payments made to workmen in their employ, and the books or documents containing such records shall be open for inspection by the fair wages officers of the Government at any time it may be expedient to the Minister of Labor to have the same inspected.

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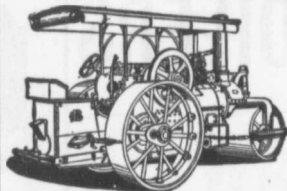
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THE TALLEST BRICK CHIMNEY IN THE WORLD.

The Alphons Custodis Chimney Construction Co., of New York, has received a contract to build the tallest chimney in the world—in fact, the tallest structure of any sort save the Eiffel Tower and the Washington Monument—from the Boston and Montana Consolidated Copper and Silver Mining Co., at Great Falls, Mont., says the Engineer. The chimney will rise 506 feet above the top of the foundation, and will have an internal diameter at the top of 50 feet. The size of the chimney has been proportioned for leading off 4,000,000 cubic feet of gases a minute, with a maximum temperature of 600 degrees F. The gases consist mainly of SO₂ from the smelter furnaces, and will travel 2,000 feet through flue ducts before reaching the chimney. The chim-

ney is designed so that an additional sixty feet may be put on at any time in case additional draft is desired. The point where the chimney is to be built is 3,535 feet above the sea level, and on account of the exposed location and the strong gales in Montana the chimney has been designed to withstand a gale of 125 miles an hour.

Assuming a unit weight of 116 tons per cubic foot of brickwork, the maximum pressure at the foot of the chimney, due to the dead weight and the wind pressure, is computed at twenty-one tons per square foot. There will be four flue openings in the bottom of the chimney, each flue having 528 square feet of area. The entire chimney is to be lined with Custodis sectional lining, laid in acid-proof mortar. The present common brick chimney at the smelter, which

is 186 feet high by twenty feet in diameter, has cracked badly, on account of the influence of the SO₂ gases on the cement mortar. In designing the new chimney, special care has been taken to have it resist the influence of the sulfuric acid gases. The sectional lining will consist of a 4-inch acid-proof brick laid in acid-proof mortar and separated from the main wall by an air-space of two feet.

To prevent the flue dust from settling behind the lining, special form bricks will be employed and all spaces at the top of each section of lining, through which the dust might find its way, will be closed with mineral wool. The top of the chimney will be protected with a terra cotta cap with overlapping edges laid in acid-proof mortar. As the heavy gases will fall in rainy weather alongside of the chimney,

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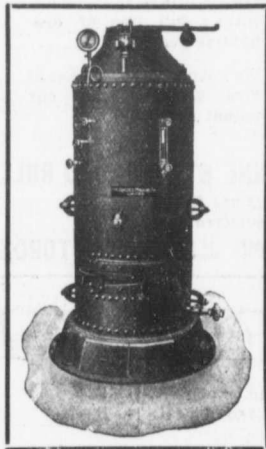
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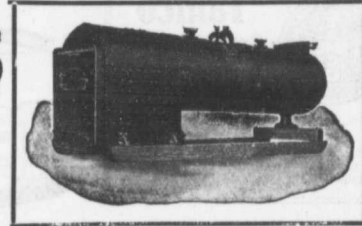
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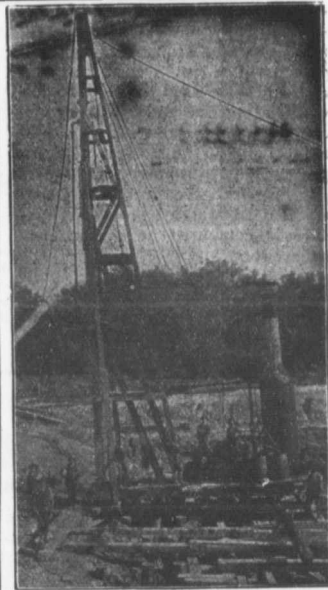
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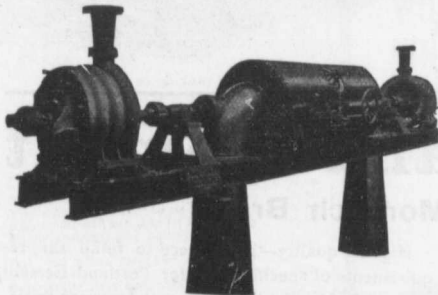
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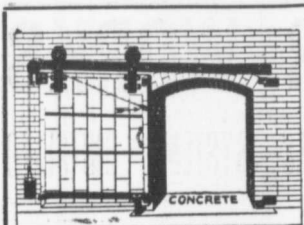
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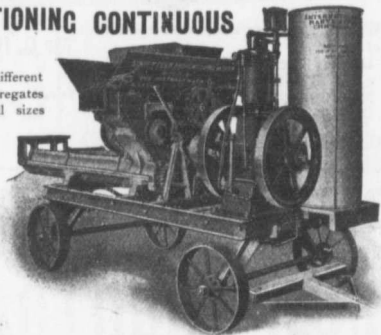
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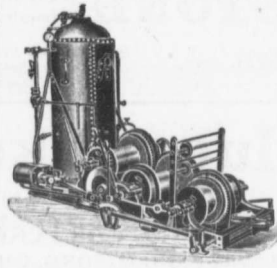
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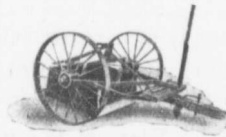
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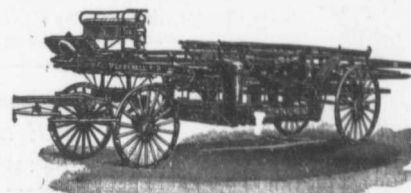
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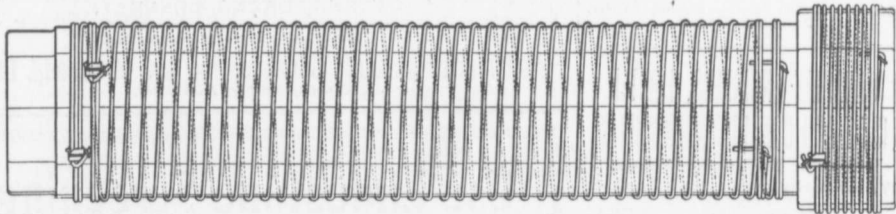
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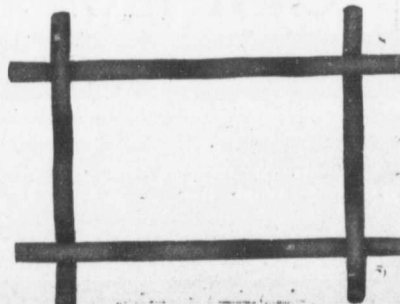
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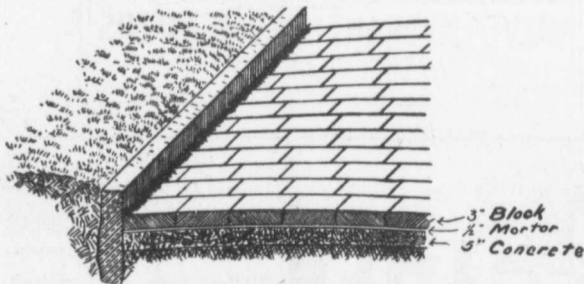
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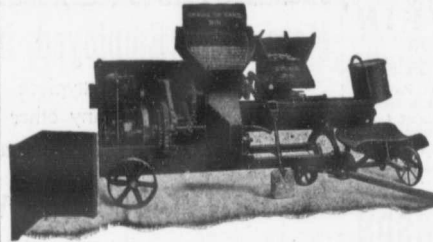
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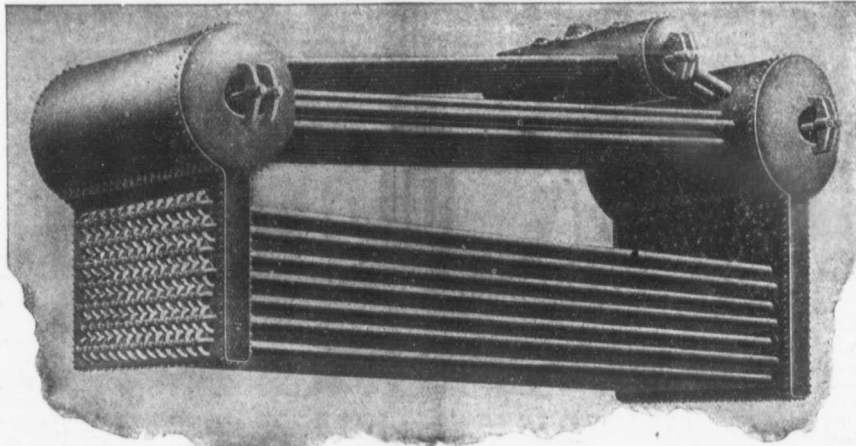
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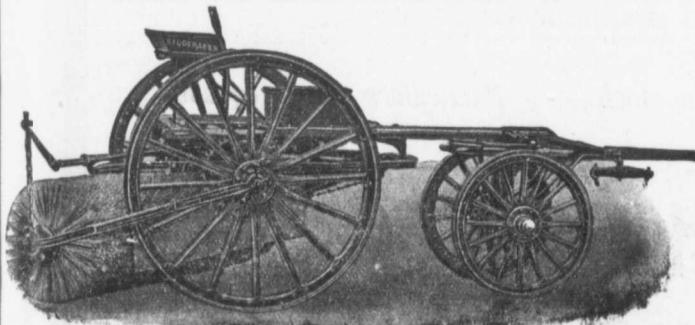
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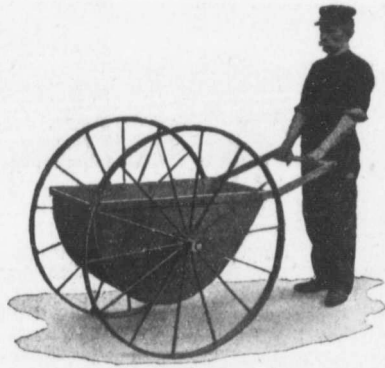
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