

made on Mary street, to cost \$2,940.—L. Hills, architect, is calling for tenders for the erection of a flour mill.—The following building permits have been granted: The Hamilton Gaslight Company a stone building at the entrance to the gas works, on Mulberry street, cost \$2,700; Frederick Boehm, a two-story brick dwelling and shop on Main street, between Catharine and Walnut streets, cost \$1,500.—Charles Bush, two 2-story brick dwellings on Euclid avenue, between Copeland avenue and Barton street, cost \$2,000; George T. Tuckett, brick residence on King street, between Queen and Ray streets, cost \$30,000; Robert Thomson, two 2-story brick dwellings on Hannah street, between By and Caroline streets, cost \$3,000.

OTTAWA, ONT.—E. F. E. Roy, Secretary Department of Public Works, will receive tenders until the 3rd of June for the construction of a hull for a steam elevator dredge, 152 feet in length of keel and 30½ feet in breadth. Plans may be seen at the office of Superintendent of Dredging, Sorel, Que., at the office of the Public Works Department, Kingston, and at the Department of Public Works, this city.—A deputation from Deseronto were in the city recently for the purpose of urging upon the Government the necessity of granting a subsidy to the Kingston, Napanee and Western Railway for extensions of their line to Sydenham and Bridgewater.—The City Council recently received a letter from Messrs. Moodie & Son, of Terrebonne, Que., offering to remove to this city and erect large factory buildings providing the city would grant them a bonus of \$25,000 or \$30,000. The Council has decided to offer them exemption from taxation for twenty years in lieu of the bonus.—Robert Sirters, City Engineer, will receive tenders until Tuesday, 7th June, for the iron superstructure of a bridge of four spans to be erected across the Rideau river at Cummings Island, connecting the city of Ottawa and the County of Carleton.—The City Council has granted exemption from taxation for ten years to Mr. Thackeray for the rebuilding of his mills. These mills and machinery will cost in the neighborhood of \$30,000.

TORONTO, ONT.—Mr. G. M. Miller architect, wants tenders until to-day for the erection of a stable on Huron street.—A deputation of ladies waited on the City Council during the past week asking for assistance to enable them to erect a new building, for the Prison Gate Mission on Seaton street. Plans have been prepared for a building to cost \$23,000. Messrs. S. H. Blake and G. A. Cox have promised that if the Council will provide the sum of \$14,000, they will furnish the remainder.—The City Council want applications for the position of City Engineer.—James Gowanlock, Chairman Waterworks Committee, will receive tenders until Monday, 30th inst., for one ten-ton weighing scale required at the main pumping station.—The City Engineer has recommended the laying of sidewalks on various streets, to cost \$13,456.—Messrs. Smith & Gemmill, architects, 26 Bank of Commerce building, will receive tenders until to-day for the erection of a brick and stone school building for the College street Presbyterian church.—The promoters of the Infants' Home on St. Mary street are endeavoring to secure funds for the erection of a new wing to the present building.—The following building permits have been granted: George Warrell, five att. 2-story, b. f. dwellings, 152-60 Sydenham st., cost \$5,000; Davidson Todd, two pr. s. d. 2-story & attic bk. dwellings, s. w. cor. Admiral Road & Bernard st., cost \$20,000; Wm. G. Osgoodby, 5-story bk. & stone warehouse, s. side Melinda st., w. of Jordan st., cost \$30,000; Adam Beatty, addition to 89 Berkeley st., cost \$1,000; J. W. T. Harrison, det. 2-story and attic bk. dwelling, s. side Dunbar Road, Rosedale, cost \$4,000; A. E. Walker, 37 Sussex ave., pr. s. d. 2-story & attic bk. dwellings w. side Spadina Rd., s. of Dupont st., cost \$17,000; Isaac Anderson, 2-story bk. stable & coach house, rear of 140 Dowling ave., cost \$1,200; John Crouch, pr. s. d. 2-story bk. dwellings, 213-15 Euclid ave., cost \$4,000; B. G. Turner, five attached 2-story and attic brick dwellings, adjoining Salvation Army barracks Farley avenue, cost \$10,000.—It is understood to be the intention of Mr. Thos. Thompson, dry goods merchant, King st. east, to make improvements to his premises by converting them into an arcade, extending to Jarvis street.—

Rev. C. E. Thompson is about to erect a detached residence on Davenport avenue. Mr. J. A. Fowler, Elgin block, Yonge st., is the architect.—The old school building on Yonge st. Thornhill is to be pulled down and rebuilt.

#### FIRES.

The pulp department of the paper mills at Georgetown, Ont., was partially destroyed by fire on the 15th inst. They were owned by Messrs. Barber Bros. Loss, \$8,000.—The furniture factory of Messrs. Dowling & Leighton, at Harrison, Ont., was badly damaged by fire on Saturday last, destroying most of the machinery and tools.—A dwelling house at Coverdale, N. B., owned by E. S. Outhouse, was destroyed by fire last week. Loss \$1,600; insurance \$500.—Fire at Midland, Ont., on Wednesday last, destroyed N. Laraman's store, loss on building \$1,200; and E. O. Donohue's clothing store, loss \$1,300.

#### CONTRACTS AWARDED.

LONDON, ONT.—Messrs. Tambling & Jones will erect a new brick store on Dundas street for Mr. John Morman.

QUELPIH, ONT.—The Stratford Bridge Company have been given the contract to construct a bridge at Allan's dam, at the price of \$1,850.

GLENBORO, MAN.—The contract for the erection of a new school house has been awarded to Messrs. McDonald & Sifferdecker, of Bolton, Ont., at \$2,500.

NORTH BAY, ONT.—The contract for the construction of a system of waterworks has been awarded to Messrs. Garson & Purser, St. Catharines. Their tender was \$28,900.

GALT, ONT.—Mr. John Cherry has let the contract to Messrs. Griffin Bros for a two-storey residence on Lansdowne road. The building will be of red pressed brick, and will cost about \$5,000.

HALIFAX, N. S.—The contract for Mr. Cohn's new laundry building on Barrington street has been awarded to John Causey, the contract price being between \$8,000 and \$9,000.—Samuel Marshall has been awarded the contract for the new building for the Good Shepherd monastery on Quinport street. The contract price is \$18,000.

QUEBEC, QUE.—David Ouellet, architect, has awarded the contract to Mr. Jos. St. Hilarie for the inside decoration of the church of the parish of St. Lawrence, Orleans Island. Rev. W. Blais curate; value \$2,300. The same architect has awarded the contract to Mr. Alphonse Matte, of Rimouski, for the inside work of a church in the parish of the Sacred Heart of Rimouski; Rev. A. Audet, curate; value, \$8,000.

KINGSTON, ONT.—Contracts have been awarded as follows for converting the Regiopolis College into an hospital: Masonry, carpentering, painting and glazing, T. H. Fitzgibbon, Brockville; plumbing and gasfitting, McKelvey & Birch; elevator, Leitch & Turnbull, Hamilton. The work will cost about \$50,000.—Mr. W. H. Rogers, of Williamsville, has received the contract to build a grand stand, bicycle track and 2,100 feet of fence on the bicycle grounds, at the price of \$2,670.

TORONTO, ONT.—The Board of Works has recommended the acceptance of the tender of the Gutta Percha & Rubber Manufacturing Company for 300 feet of 2½ inch hose at 90 cents per foot, also that of the Toronto Rubber Company for 300 feet of 2½ inch hose at 90 cents per foot, less 10 per cent.—Mr. E. J. Lennox, architect, has awarded the contract for brickwork for the new hotel and bank building, corner King and Jarvis streets, to Messrs. Farquhar & Yorke, at the price of \$27,000, also for a factory on Duke street, for Messrs. Christie, Brown & Co. as follows: Carpentering, T. G. Gearing, \$10,000; ironwork, G. F. Bostwick, \$15,000.—The Sanson brand Portland cement, manufactured near Owen Sound, Ont., has been selected for building a new gas-holder tank to be constructed on Bathurst street, for the Consumers Gas Co., Toronto. About 7,000 barrels will be required.

The force exerted in the act of expansion of material is very great. Brick walls have sometimes been misplaced by the expansive force of a steam pipe. In many cases it is indispensable that some provision be made for such change of dimensions.

## MUNICIPAL DEPARTMENT.

### ROCK EXCAVATION OF TRENCHES FOR WATER WORKS PURPOSES.\*

By A. L. McCULLOUGH, A. M. CAN. SOC. C. E.

(Continued from last week.)

Some distance in the rear of the drilling gang come the blasting gang who first sand pump from each drilled hole any dirt accumulation and then sponge out with a long wooden bar about one inch thick, usually of balsam or some evergreen wood with the bark peeled off, the bar also serves as a tamping bar. The sponging finished, the hole is then filled with the explosive. Judgment must be exercised in the kind, the strength and form of an explosive needed in the different classes of work. There can be no difference of opinion in the results required in trenching operations such as I am here describing—the rock must be so shattered that it can be handled with pick and shovel. In thick bedded rock a strong explosive is necessary, but in the thin bedded rock such as is met with in Galt, an explosive with 30 to 35% nitro glycerine proved sufficient for all purposes and did its work well. I do not think, though, that an easier rock for blasting than here met with is often found, nor would it be wise to use duclim or dynamite with less than 30% of nitro glycerine in its composition. The explosive used was duclim, made by the Hamilton Powder Co., put up in cylindrical paper covered cartridges about ten inches long and 1¼ inches in diameter, but furnished to order in any required size. Duclim or "false dynamite" is a mixture of nitro-glycerine with some granular absorbent of explosive substance. Fine dynamite has in it granular absorbent. The nitro glycerine undergoes no chemical change by this absorption, but retains all its characteristics—it freezes, burns, explodes, etc., under the same conditions as when in the liquid form, the absorbent minimizing the danger of explosion in transportation and handling by acting as a cushion to the nitro glycerine. The Duclim cartridges or "sticks" as they are always called by men on the work, are packed in saw dust in wooden boxes containing 25 or 50 lbs. each. Its transportation is very expensive, some of the railway companies refusing to carry nitro glycerine in any form, while with those that do it is with the following instructions: "That each car must be labelled "dangerous explosive," that cartridges must be packed in saw dust, as must also the box containing them that a man must accompany each car to its destination. The company I believe do not ship in smaller quantities than in lots of 50 cases. For these reasons dynamite is rarely used on small undertakings unless there happens to be a quantity stored in the locality. When bought in large quantities it costs about 25 cents per lb. After being brought to the place of destination, as a guarantee to the security of property, the dynamite must be stored in some isolated place; usually it will pay best to put up a temporary store house with stove for heating and shelving for spreading out the dynamite when thawing. Dynamite freezes at about 45° Fah., and when frozen is very difficult to explode, so that before use it must be thawed, which should be done gradually by spreading the cartridges out on some shelving in a warm room some distance from the fire. The dynamite cartridges are exploded by the use of a fulminating cap and safety fuse with a Siemens magneto-electric blasting apparatus. The cap or exploder used with ordinary safety fuse is a hollow copper cylinder about ¼ inch in diameter and an inch or two in length containing 15 to 20% or more of fulminate of mercury mixed with some other ingredient into a cement. The mouth of the cap is closed with a sulphur cement through which pass two fine wires about ⅛ inch apart connected in the fulminate with a fine platinum wire which is heated to redness with the current of

electricity, ignites the fulminate and explodes the cap. These exploders, called platinum caps are sold in bunches of fifty, are always kept separate from the dynamite until wanted for use, when they are fastened into the cartridge.

The electrical machine consists of a wooden box about the size of a small transit box, in the side of which are two openings for attaching the two leading wires to the exploders. From the top of the box projects a handle on a vortical bar, which is toothed and gears with a small pinion inside the box. When a blast is to be fired this handle is raised as far as it will come and then pressed down quickly, putting into operation by means of the pinion the magneto-electric apparatus inside the box, generating the electricity which is liberated the moment the handle in its downward motion strikes a spring near the bottom of the box. The electrical machine is usually placed about 60 to 100 ft. or more as the necessity of the case requires, from the blast, and is connected thereto by two cotton covered copper "leading wires."

It is always better in trenching work to fire a number of holes simultaneously thereby getting the maximum effect from each charge, the number so fired being only limited by the length of the blasting shield and of the capacity of the electrical machine. Where this is done each hole has a platinum cap inserted in its charge, and one of the short wires attached to each cap is joined to one of those of the next cap, so that at each end of the series there is one free end of a short wire to one of each a "leading wire" is fastened thus producing a circuit from the electrical machine. The electrical machine size No. 3 weighs about 16 lbs. and costs about \$25.00, while the next size costs about double that. After each hole is sponged out it is loaded with the dynamite. The paper covering to the cartridges or sticks as the men call them, should be slit open the whole length with a sharp knife thereby allowing the dynamite to get free and to thoroughly fill the hole when pressed down with the wooden tamping bar. This operation should be repeated with each stick. When within two feet of the surface a half stick with exploder attached is put in with another stick on top of that, the top of the hole is then filled with sand tamped solid, when the hole is ready for the charge, and such a charge will let daylight into any rock. A half dozen of these holes charged simultaneously will break the rock almost as fine as macadam for a length of fifteen to twenty feet, so that the men can handle it entirely with pick and shovel. The results may be better illustrated when I explain that according to the specification no rock greater in weight than 50 pounds is to be returned to the trench, and we had no trouble in enforcing it; for the simple reason that there were rarely any left to go back. With such a blast then as this; in order to prevent injury to person and property on the public streets from scattering stones and debris, it was necessary to cover the blast. The method of covering with loose timbers, brush, etc., might possibly do with an exceedingly light blast or with work in the open country, but on public streets lined with houses with people constantly passing and repassing, some method more economical of time, more satisfactory and secure in its results is necessary. For the purpose the contractors used a shield made on the following simple principle: 5 oak timbers 12 x 12 and 20 feet long placed side by side and thoroughly bolted together, forming a platform 5 feet wide, sheeted on the bottom and sides with ¾ inch boiler plate riveted into one piece and with the timbers thoroughly bolted together. The shield weighed about 5 tons and did its work most effectively. By its use the contractors could load each hole to the surface without fear of results. I have yet to hear of any person who was injured in any way during the construction of the works, and probably not more than a half dozen window lights were broken after the first week's

\* Paper read at annual convention of Association of Provincial Land Surveyors of Ontario.