

crete of 235 lbs. per sq. in. and 2,350 lbs. per sq. in. in the steel. This stress in the concrete being less than its ultimate strength, we did not expect to find any vertical cracks with a resultant leakage.

The reservoir at Bridgewater is 78 ft. in height and 38 ft. diameter, and the walls at the base are 20 in. thick. This reservoir has never shown a particle of leakage. The stresses developed in concrete and steel are about 240 lbs. lbs. and 2,400 lbs. per sq. in. respectively. As an example of comparatively thin walls with a resultant leakage we will cite the reservoir at Attleboro, Mass. This reservoir is 100 ft. in height, 50 ft. in diameter, and the walls at the base are only 18 ins. thick; 1:2:4 concrete was used in its construction; 13,500 lbs. per sq. in. was the working stress adopted for the steel. From our previous examples, the stress in concrete and steel would be about 500 and 5,000 lbs. per sq. in., but the stress in the concrete so far exceeded its ultimate strength that numerous vertical tension cracks must have developed to a considerable height. In this case presumably the relative values of concrete and steel would not hold, but a stress of steel must have been developed to somewhere near the working value assumed. Several attempts have been made to make this reservoir water-tight, but each refilling has always resulted in leaks. The cracks in the concrete have probably been reproduced in any surface coating which has been applied.

A reservoir 70 ft. diameter and 22 ft. in height containing 20 ft. of water was constructed in Bondsville in 1908. The walls were 12 ins. thick, and composed of 1:2½:4½ concrete with 5 per cent. hydrated lime added to the cement. The unit stress in the steel is 14,000 lbs. and in the concrete at the base 260 lbs. per sq. in. The ultimate strength of a 1:2½:4½ concrete in tension may be assumed to be 100 + 25 per cent. + 10 per cent. = 137 lbs. per sq. in. Therefore the actual strength of the concrete was considerably exceeded. The owners expected an absolutely tight structure. When it was filled, considerable leakage developed at the joints, although there were no actual streams or jets of water coming through. The writer is informed that upon examination many vertical cracks were found in the concrete walls in the interior.

It is hard to say just what factor of safety against bursting there is in a concrete reservoir. We are, however, working on the side of safety in making the walls thick instead of thin. There is on record the case of the complete failure of a concrete reservoir in New South Wales described in Engineering News, of June 16, 1910. This reservoir is 40 ft. high and 40 ft. interior diameter, capacity 314,000 gals. The walls are 10½ ins. thick at the bottom and 4½ ins. thick at the top. It was built of a 1:2:2 concrete. The reinforcing rods are round rods with a working stress of 16,000 lbs. per sq. in. These rods are laid in one vertical plane.

NEW INCORPORATIONS.

A new firm known as the P. J. Mitchell Company, Limited, has been recently incorporated. Mr. Mitchell has secured sole agencies from the following firms for sale, in the Dominion, of their various manufactures, the benefit of which will be transferred to this company:—

Greenwood & Batley, of Leeds.—Small turbo generators, high pressure, mixed pressure and low pressure types and other plant.

Fullerton, Hodgart & Barclay, Ltd., Paisley.—Steam engines of all types, winding engines, reciprocating air compressors, dock pumping machinery and evaporators.

Lassen & Hjort, London.—Patent water purifying and softening apparatus and other specialties.

Aster Engineering Company, Limited, Wembley, Middlesex.—Oil and petrol engines, small gas producers and water meters.

Higginbottom & Mannock, Ltd., West Corton, Manchester.—Electric wharf and dock cranes, jib cranes, haulages, electric winches, electric passenger and goods elevators and all types of cranes of their manufacture except large cantilever cranes for shipbuilders and large harbor floating dock cranes.

Boulton & Paul, Ltd., Norwich.—"Norvic" Petrol Gas Installations for lighting, cooking and heating.

The British Vacuum Cleaner Company, Ltd., London.—Vacuum cleaning apparatus.

Thomas C. Fawcett, Ltd., Leeds.—Brick making, cement, briquetting, and crushing machinery.

L. Sterne & Company, Ltd., Glasgow.—Refrigerating and ice-making machinery.

Mr. Mitchell is in negotiation on behalf of the company for further agencies with firms whose products he considers are likely to meet with a ready sale in Canada.

Nelson, B.C.—Elford Boat Company, \$50,000.

Wilmer, B.C.—Windermere Orchards, \$250,000.

Nelson, B.C.—Nelson Club Cigar Company, \$50,000.

Phoenix, B.C.—Phoenix Investment Company, \$250,000.

Kingston, Ont.—Church Life, \$5,000. Mrs. V. K. Birkett, J. H. Birkett, L. H. Birkett.

St. John, N.B.—Natural Products, \$4,000. C. D. Jones, F. P. Vaughan, W. E. Raymond.

Brantford, Ont.—Mohawk Land Company, \$100,000. H. Cockshutt, L. Harris, J. A. Sanderson.

Hartland, N.B.—Hartland Woodworking Company, \$15,000. J. T. G. Carr, D. H. Nixon, S. S. Miller.

Port Stanley, Ont.—Port Stanley Telephone Company, \$1,000. N. Burton, E. Earnshaw, A. Burton.

Ottawa, Ont.—Mica Company of Canada, \$300,000. H. S. Ross, R. Taschereau, T. Rinfret, Montreal.

Winnipeg, Man.—Griffiths Electric Contractors, \$500,000. N. Griffiths, J. K. Bock, E. P. Powles, London, Eng.

Navan P.O., Ont.—Russell Rural Telephone Company, \$9,000. G. J. Bonsfield, R. Clarke, W. H. Cox.

Walkerville, Ont.—Walkerville Hardware Company, \$60,000. A. D. Green, J. R. Coate, J. W. Coatsworth.

Brockville, Ont.—Coleman Baking Powder Company, \$50,000. H. A. Stewart, J. Culbert, A. M. Patterson.

Dryden, Ont.—Weiner, Presner & Company, \$20,000. J. Weiner, K. Weiner, Dryden; P. Presner, Winnipeg.

Summerland, B.C.—Angove & Stinson Company, \$25,000. Okanagan Commercial Orchards Company, \$100,000.

Providence Bay, Ont.—Manitoulin Island Rural Telephone Company, \$2,000. W. I. Wagg, F. Wagg, A. Caddel.

Victoria, B.C.—Coronet Coal Mineral and Oil Lands, \$250,000. Omineca Water and Power Company, \$50,000. West Pacific Canning Company, \$50,000. British Realty, Ltd., \$10,000.

Hamilton, Ont.—Canadian Mathews Gravity Carrier Company, \$100,000. J. S. Lovell, S. G. Crowell, W. Bain, Toronto. Consumers Lumber Company, \$75,000. C. H. Long, F. Burton, R. Stewart.

Toronto.—Rockwood & Company, \$300,000. G. Grant, A. Dods, M. MacDonald. Sovereign Hall Company, \$25,000. W. H. Skitch, J. M. McGowan, G. McKenzie. Dominion City Estates, \$350,000. G. Fuller, Manchester, Eng.; J. J. Hoidge, A. E. Adams, Toronto. Sovereign Construction Company, \$50,000. J. I. Grover, Misses L. O. Richardson, E. K. Avery. Leak & Company, \$40,000. W. Leak, H.