shut out from the world of affairs, the equipping, the designing, the producing and the finishing end of the establishment. To direct the work of the chemist, to make full use of his discoveries, to secure full returns from his efforts, requires the knowledge and skill of the engineer.

The engineer is required to build, on commercial lines, the laboratory apparatus of the chemist. The chemist must guide and assist the engineer, and carry on cheaply in the laboratory experiments that would be ruinous if conducted in the factory or in the field by the engineer.

Happy the firm that can secure, in one person, the chemist and the engineer! This is seldom possible. Usually the combination is not profitable, but always the engineer and the chemist should understand each other and should co-operate.

WATER CONSUMPTION.

The Water Commissioners for the city of Galt, Ont., have had considerable trouble locating the great water consumption or water waste that has been taking place. Recently, they put a meter in a local manufacturing establishment and found, in thirty-seven days, twenty-one hundred cubic feet, or for a year one million three hundred and twelve thousand five hundred gallons were used. For this, ten dollars was being paid.

Doubtless this was a great surprise to the Galt board, and there are surprises in store for any board of water commissioners that are able to install meters on an unmetered system.

Metering water supply systems is the fair way—fair to the taxpayer, the water user and the waterworks department, and the discovery of such conditions as were found at Galt will do much to educate those responsible for such installations.

CEMENT MARKET IN NEWFOUNDLAND.

The increased cost of lumber and timber in the island has made the Newfoundland builder look to cement as a suitable building material, and greater quantities of cement are being used annually.

Last year Belgium imported into Newfoundland almost as much cement as did Canada. It is true the annual consumption of cement in the island is not large, the imports not exceeding 22,000 dollars, but the trade commissioners expect great growth in cement imports, and Canadian manufacturers should be able to enter the field and hold their own against Belgium and Great Britain.

TIMBER CROPS.

In 1882, Cook Brothers, lumbermen, cut over the township of Sprague, a timber berth near the Serpent River in Ontario. This year the Saginaw Salt and Lumber Company have cut several million feet from the same limit, the Cook Brothers having thrown the limit up in 1882 as valueless. In twenty-seven years the saplings had grown to merchantable timber.

Another example is that of Cobden township, west of Blind River, Ontario. Some years ago an Ottawa firm cut over this limit. This year Moore & McDonald took off a second cut, and secured more than did the limit owner at the first cut.

The Ontario Government regulations now prohibit the cutting of trees less than ten inches in diameter and require that limit holders avoid injuring the growing crop, so that we may now expect to hear of regular crops of timber.

STRESSES IN MASONRY DAMS*

William Cain, M. Am. S.C.C.E.

*Concluded from page 312, Vol. XVII.

On comparing these formulae with those of the writer, it will be observed that the absolute term in the value of q and a consequent term of the first degree in x, in the value of p', are lacking in Mr. Hill's formulae. This results from taking the inner face as vertical. Although the coefficients also differ, it is seen that the numerical values are very nearly the same.

In Fig. 6 are shown, on a drawing of the dam, to scale, the lines of the centers of pressure for reservoir full and empty.

To the right, and under the word "factors," are certain numbers, written in the form of fractions. For any joint, the upper number gives the factor against overturning, or the number by which it is necessary to multiply the water pressure down to the joint, to cause the total resultant to pass through the outer edge of the joint considered. The lower numbers give the ratio of the weight of masonry above a joint to the water pressure corresponding.

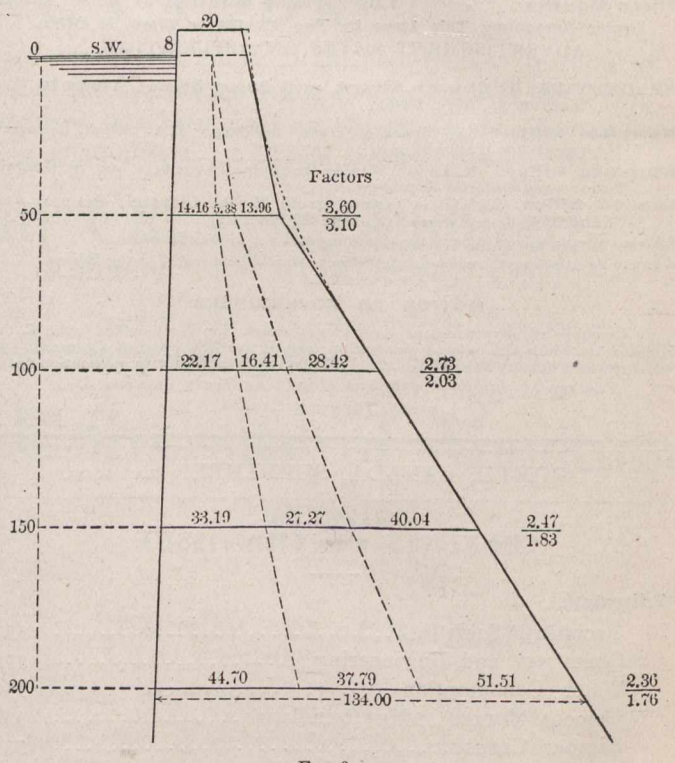

FIG. 6.

It is believed that these "factors" should increase from the base upward, to allow somewhat for earthquakes, expansion of ice in freezing, etc., since the effect of such accidental forces is proportionately greater on the upper joints.

Stresses due to water infiltration are not included here; neither are stresses due to temperature changes.

The unit stresses, f, in pounds per square inch, acting parallel to the adjacent face, are as follows, and refer to the outer edges of the joints, for reservoir full, and to the inner edges, for reservoir empty:—

h,	f at outer edge,	at inner edge.
50	85	58
100	136	133
150	204	180
200	275	228

The stresses, f, are normal pressures on planes perpendicular to the respective faces, and are the greatest stresses that can be experienced in the dam. In fact, they are greater than the true stresses, since the trapezoid law is not exact, particularly near the base, as before remarked. It would then seem that the dam, thus far, is safe, since the maximum unit stress is less than concrete, even, is subjected to daily, in good practice.