

as it was for immediate use; the bags weighed ninety pounds and four of them constitute a barrel. Some of the gravel was hauled by men who received \$3.50 a day for themselves and teams; being near the pit, eleven loads were hauled in a day's work; where the road was good and the haul out of the pit not difficult, a wagon box of one and one-half cubic yards' capacity was used. An estimate of the cost is made at a rate of 12 cents a square foot, although this particular walk however was built by day labor.

28½ ft. length of 4 ft. walk = 1,142 sq. ft.

17½ " " 9½ " = 229½ "

10 " " 6½ " = 65 "

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Total, 1,436½ sq. ft. at 12 c. = \$172.37½.

These measurements were made with a tape line; by "stepping-off" the length, and averaging one's pace, a close approximation of the actual cost was reached.

We afterwards secured some of the cement and examined for fineness, alkalinity, effect on skin, etc. Tests were made, too, of the strength of mixtures of different proportions. Some successful object and map modelling was done with it by some of the students. And in this connection it might be suggested that its use is so simple that some repair work on broken walls might be instituted in some schools as a legitimate Nature Study lesson on cement.

A word on the chemical constitution and action of Portland cement might be of interest and use. In general terms it is a combination of lime (CaO), silica (SiO<sub>2</sub>), alumina (Al<sub>2</sub>O<sub>3</sub>). The lime is furnished by marl and the other two by clay. For good setting qualities certain proportions are essential: 55 to 60% lime; 22 to 25% silica; 7% alumina. Sufficient and no excess of lime to combine with the other ingredients is the desideratum. Water permits the union and crystallization. In a simple form of equation it might be represented thus:

<i>Base.</i>	<i>Acid.</i>	<i>Salt.</i>
CaO (Lime)	+ SiO <sub>2</sub> (Silica)	= CaSiO <sub>3</sub> (Calcium Silicate).
CaO (Lime)	+ Al <sub>2</sub> O <sub>3</sub> (Alumina)	= CaAl <sub>2</sub> O <sub>4</sub> (Calcium Aluminate).

So that the artificial stone substance is a mixture of calcium, silicate and aluminate.

In the last report of the Bureau of Mines, part I, recently published by the Department of Lands and Mines of Ontario, there is a very complete account by Mr. P. Gillespie of the cement industry in this province. Some facts are here included from that report, not for the purpose of informing teachers of matters to be retailed to children, but rather to awaken interest in this line of