assumption that the science is everything, and the art a very secondary portion of our subject.

That this was the tendency among sanitarians in Great Britain, when sanitary plumbing received a fresh impetus some ten years ago, may be seen from the following remarks by S. Stevens Aellyer :

"If I were going to build a house for my own occupation, I should prefer the plumbing work to be done by the man who was more skilled in the science than in the art of his craft—that is to say, I should prefer a poor joint wiper to a clever one, providing the former knew what the latter did not, viz., how to select and arrange the trap, pipes, and fittings, so that they would be 'self-cleansing'; what kind of traps to select, and how to ventilate them so that they would not lose their water seals, how to ventilate the waste-pipes, soil pipes, and drains, so that the air within them should be constantly changed—know, in short, how to execute his work on sanitary principles."

In these days of *specializing* and *high speed*, it would almost be impossible to find a man who might be considered equally competent to lay out both a system of plumbing for you, and construct the same from cellar to attic with his own hands. We do not expect it. We do not want it. But we do insist on the joints being well wiped, the bends properly made, and the bells tightly caulked.

That the whole system be as simple as possible and consistent with convenience, efficiency, and security.

I think this appeals to all scientific minds, though I know of certain plumbers in this town, who, if judged by their works, certainly could not be said to agree with me in this respect.

However, I am glad to notice that there is a strong tendency towards simplification in plumbing work throughout this continent, which will tend to make good plumbing more popular and less costly, and I firmly believe that a judicious use of anti-siphonic traps will prove one of the greatest factors in simplifying the house-plumbing of the future.

While I do not admit that they are preferable in *every* case, and for *all* fixtures, still I will say this, that the better kinds are more trustworthy, and less liable to get out of order than architects and sanitarians imagine, and further, that for certain cases they are undoubtedly the only traps that meet the requirements to any degree.

Owners should be advised against such fads as, for instance, having a basin, or other fixture, placed in some remote corner of the house, and at a considerable distance from any of the main pipes of the plumbing system. Such arrangements greatly increase the number and complication of pipes, not to speak of the cost, and the fact that security is being sacrificed, in a measure, for trifling convenience.

At present the vent-holes in water closet fixtures are made too small. A water closet trap should be vented with nothing less than a 3-in. vent pipe, and running traps under basins, etc., should be vented with vent-pipes at least of the same size as their wastes, and in most cases a little larger diameter is preferable.

Sanitarians seem to forget that while ventilating pipes are useful in preventing the siphoning of traps, their principal work is to ventilate. Experiments have shown that they cannot do this *effectively*, unless they are made large enough.

As sink wastes have a tendency to be too large, we may therefore expect to see, in the near future, the diminution of the diameter of certain wastes, and the enlarging of certain ventilating pipes, and thereby the increasing of the efficiency of both.

That the appliances used be economical, reliable, and adding materially to the comforts of the inmates of the building.

In conclusion, I may say that the number of fixtures in a dwelling should be kept down as much as possible. Not merely from a consideration of economy, but from the more important standpoint of health. The oftener traps are used the better. Where a house has a large number of basins, some may be rarely used, and their traps are liable to evaporate away. Wherever overflow-pipes can be done away with, it is for the better.

Basins provided with the Boston plug, which acts both as a plug and as an overflow waste in itself, are the best fixtures of the kind on the market to-day. Wastes from refrigerators, cistern, safes, etc., of course should never be connected directly to the plumbing system, but all these secondary points are well treated in any of the more recent books on the subject.

After all, the underlying principle of "sanitary plumbing," is to secure such an arrangement of pipes, traps, and fixtures, that any solids, liquids, or gases can readily and speedily find an entrance into the plumbing system, at any of the openings in the house; but that having once gained an entrance, they can never-more return to injure the health of the inmates of that dwelling. When this fundamental principle is thoroughly understood, it should not prove a hard task to determine upon a sanitary system of house drainage.

The Hobbs Hardware Company, London, Ont., will start a bevelling, silvering and plating factory.

Mr. E. R. Burpee, is at the head of a company which proposes to establish granite polishing works at Calais, N. B.

Mr. Peter Nicholson, one of the oldest contractors of the city of Montreal, died on May 3rd from injuries caused by a runaway horse. Deceased, who was seventy-one years of age, was a native of Castleton, Caithness, Scotland. He was a resident of Montreal for thirty-four years.

MANUFACTURES AND MATERIALS

HYDRAULIC CEMENTS—NATURAL AND ARTIFICIAL, THEIR COMPARATIVE VALUES.*

(Continued from April Number.)

The Board of Public Works, or the city engineer advertises for cement. The specifications call for a certain fineness, and so many pounds tensile strain—1 hour in air and 23 in water.

Then up comes the great unwashed army of cement-makers, who, unlike the engineers that sit in judgment over their hard-wrought products, have not yet awakened to the wondrous advantages of association, having no "A. S. C. E." (American Society of Cement Experts), through which to elevate their calling to the dignity and standing it deserves. And so they scramble up to the engineer's office each with his pockets filled with testimonials proving his cement to be the best manufactured in the United States.

And what of the engineer? We notice a peculiar gleam in his eye, that we never observed before. Serenely he surveys the group of uneasy cement-makers before him. He opens the bids, and as usual, the figures are all bunched closely together. The cement-makers are anxious. Not so with the engineer, for with a sardonic smile he vouchsafes the blood-curdling information, that the board had ordered a testing machine.

In the course of time it is announced that the contract has been awarded to Mr. A., as his cement stood the highest in the test. Then another city advertises, and the same operation is repeated, and B gets the contract, because his cement stood the highest in the test. And so with one city after another, and the cement-makers from A. to Z. all get a chance, and all are satisfied, for each has found a place where his cement has tested the highest, thus proving conclusively that each brand was the best.

In our search for the key, with which to unlock the door of discovery of the connecting link, that as we have said ought to exist between high tensile strain and first quality, we have traveled up and down the whole line, commencing with cement containing 50 per cent. clay and 50 per cent. lime, and following along up through its varying mixtures until pure white lime with no clay is reached.

These we have studied under every conceivable manner of manufacture and subsequent manipulation. Studying the varying properties, with all their bewildering and mystifying contradictions; plodding through the thousand and one phrases that are continually being developed in the course of a long experience in the study of the natural cements of this country, no two brands of which are alike in their proportions of lime, magnesia, silica and alumnia; searching the tables of tests made by prominent engineers from time to time; comparing the tables with the analyses of the brands tested; weighing carefully every feature that gave the slightest promise of throwing light on the subject; and now, after all these years, we are compelled to admit that we have not been able to discover the slightest relationship between the high test and good quality. We cannot tell what the future may have in store for us. Some genius who may not have devoted more than his spare moments to the subject, may tell us all about it.

Practical experience teaches that we can find both good and bad cements that will sustain a high tensile strain, and that we can find both good and bad cements that will test low.

Portland cement has not been in use in this country long enough to earn the position it now occupies, but owing to some peculiarity in its molecular construction, it will test higher than our American cements and will get harder. Yet hardness is no evidence of durability; with equal exposure, a flint stone will disintegrate much more rapidly than a soft magnesian lime stone.

But the demand is for a higher testing cement, and the engineer who years ago, used American cements in a sewer or bridge, without a thought of failure and with no signs of failure yet in sight, will incline to the belief that he ought to use a better cement, and so Portland is used in what are called trying places. But the fact that he once used American cements successfully in places just as trying, is dismissed, for he does not care to take any chances of that kind again, and so public opinion has been built up, and it would be a rash man indeed who would dare to stand up against it.

Even the manufacturer of a first-class American cement, who may have grown grey in the business, looking back over the field, calls to mind the work done with his cement. Here is a costly bridge with its piers reaching far down below the surface. There is a tunnel running through the base of a mountain. He recalls the great bridges over the Niagara, the water works tunnel under Lake Michigan at Chicago; the great bridges spanning the Ohio, Mississippi and Missouri; the thousands of miles of railroads with their innumerable culverts and bridges; the sewers in all the cities of the country, amounting in the aggregate to hundreds upon hundreds of miles. With all these marvelous engineering works of the past to look upon, consuming upwards of seventy-five million barrels of natural cement—all manufactured in this country, and none of these works requiring renewal on account of the poor quality of the cement used, yet the manufacturers of this enormous amount of cement are daily reminded that their cement is an article, good enough perhaps of its class, but it is only a common cement at the best.

(To be Continued.)

*Extracts from a Paper read before the Society of Arts of the Massachusetts Institute of Technology, Boston, Mass., by Mr. W. Cummings, of Buffalo, N. Y.