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Municipal Engineering.

The assertion is boldly ventured that there is no branch of engineering that requires more practical skill and sound judgment than municipal engineering, candidly admitting, however, that other branches require more scientific attainments, but upon none of whom rests more weighty responsibility than that of the municipal engineer, who is not only responsible for the best and most effectual drainage and sewerage systems, as well as the best methods of drainage, grading and improving the streets and alleys, but more especially for the very best and most effectual system of sewerage that can be devised, regardless of the necessary cost, for upon this very principal rests the health and lives of the inhabitants of the municipality. A very grave responsibility is, therefore, assumed by an engineer when planning a system of sewerage that will not breed the zymotic diseases from which many of our populous cities suffer. Careless construction has been the fruitful source of most, if not nearly all, of the zymotic diseases from which our cities suffer, and it devolves upon the engineer to see to it that health and lives are not jeopardized by carelessness and indifference in construction.

In some cities, up to within the last few years, the bottom courses of the invert of the sewers has been laid dry, allowing the poisonous liquids to perculate through and contaminate the soil, and scarlet fever has usually originated in that part of the city, where the conditions, from careless construction and irregular gradients, breed the disease.

When the engineer has accomplished his preliminary work to carry out and complete, his designs will require constant care and untiring watchfulness. Detailed plans must be prepared for the several parts of the work projected, which must be drawn with care and accuracy, specifications prepared and carefully guarded, contracts written and executed. A competent engineer knows best just what is necessary to be embodied in documents prepared for the construction of public works. Constant watchfulness will be required on the part of the engineer if he is desirous of securing careful and honest execution of his designs. A young engineer should make it a point to carefully watch and profit from the success of those older and more experienced in the profession.

It is a common error, especially among young engineers, to be led astray by the eccentricities of self-conceited persons, having more cheek than brains, and whose sole aim is to see their names in print and gain a little notriety—not that I am in the least disposed to disparage the honest and zealous efforts of ambitious engineers, but I am always heartily glad to award all merited praise for every honest effort—but a young engineer especially should be very careful, as well in his profession as in his religion, to resist the temptation of being carried away by "every wind of doctrine." My advice, therefore, is, never adopt any advanced idea, however plausible it may appear, without cautiously and very carefully weighing every proposition before giving unhesitating endorsement. At the same time he should never fail to investigate and encourage every proposition in the interest and advancement of his profession.

Sewer Ventilation.

It has been found that even in sewers of the best and most modern construction what is called "sewer gas" is generated in more or less quantity, that it arises from even fresh sewerage, but is far more noxious and dangerous to health when the sewerage has began to decompose. Even where the sewers are so constructed as to remove all the sewage to the outfall within twenty-four hours (which has been decided to be the maximum time it should take), there is still an accumulation of slime on the inner periphery of the sewers, owing to the rise and fall of the sewer line, which by leaving a deposit on the sides of the sewer is constantly manufacturing gasses of decomposition.

It is no doubt true, that the more perfect the system of sewerage is, the less foul air there is in the sewers, but, in very few towns will there be found sewers or drains where gasses are not generated, which then find their way into other parts of the sewage system, unless they are dealt with in some effective manner.

Some difference of opinion exists as to what is the actual composition of this foul air in a sewer, but it is now almost universally admitted that it is highly dangerous to health if breathed, and is also sometimes very offensive.

"The fœtid organic vapor," or sewer gas, proper has for its companions in a sewer, sulphuretted hydrogen, a most poisonous as well as unpleasant smelling gas; carburetted hydrogen, due very often to leaky gas mains or services, or to decomposing vegetable matters, carbonic acid gas or carbonic anhydride (choke damp), and some ammoniacal compounds.

The actual component parts, however, of any gas in a sewer must vary considerably with its conditions, localities, etc., in the same manner as they would in any public building or room and it is impossible to tell without costly experiments, what gasses may be prevalent in any particular portion of a sewer. But whatever may be the analysis of this foul air, there can be but little doubt that it contains organic matter floating about it as solids, and it is excessively injurious and even dangerous to breathe and that it should be caught and destroyed or rendered innocuous, and not be permitted to pass into and contaminate and poison the air we breathe.

Considerable difference of opinion has existed as to the movements of air in sewers, some engineers contending that it always found its way to the higher parts of the sewerage systems; others that it was carried with the flow of sewerage down the sewers; others that it varied with the rise and fall of the thermometer or barometer, etc. Exhaustive series of experiments upon this question have been tried, with the result that "throughout the entire series of experiments it is found beyond all question that the wind is the only agent causing movements of sewer air that could be recorded by an anemometer, and that the currents were up-hill or down-hill, according as the individual sewer experimented upon was affected by the wind."

The whole subject of scientific and sanitary sewer ventilation is beset with difficulties. Whatever system of ventilation of the main sewers in any town may be adopted it is imperative that the houses connected with them should be properly trapped, ventilated and isolated, and this, in my judgment, is of even greater importance than the ventilation of main sewers.

1. A house drain should be constructed of stoneware pipe, salt glazed, perfectly smooth inside, of true circular section and thickness of material, straight in the direction of their length with the whole sockets of proper depth, and free from any cracks, blisters, sand holes or other defects, as even the most carefully manufactured pipes vary in diameter of sockets, etc., and it is well to have them sorted before commencing the work, it is scarcely necessary to add that no "seconds" should be allowed on the works.

2. The internal diameter of the drain should not be too large, 6 inches is generally quite sufficient to carry off all the sewage from an extensive establishment, even if the water from the roofs, or a portion of them, is included.

3. The inclination is governed by circumstances, but about 1 in 60 is found to be a very convenient fall for many hydraulic and other reasons will keep a syphon clear.

4. The jointing of the pipes should be executed with great care, if cement joints are made, each pipe should be jointed separately and it should be seen that no cement is left in the drain and that the joint is good all around. Sometimes tarred gaskin is used to prevent the entrance of cement into the pipes.

5. The sockets of the pipes should be sunk into the ground at the bottom of the