

tary engineers and medical authorities has been devoted, in a certain extent, to the protection of the public health in the thickly populated districts of the civilized world by the removal and disposal of their foul wastes, it is only within the last few years that these matters have been given the attention they deserved.

Newton's first law of motion is a simple statement of the *inertia of matter*. There is a law of life very similar to that of matter, which might be called the "inertia of thought," or "inertia of habit;" although the change of environment may lead to change of thought and change of habit, it is nevertheless true that the habits and methods of life contracted in boyhood will influence, if not control, those of manhood. When we therefore consider that the control of matters pertaining to health and sanitation is to a great extent placed in the hands of those who are wholly ignorant of science and oblivious to statute, and that they have, in many cases, passed their boyhood and perhaps early manhood where lack of sanitary rules was offset by plenty of room, *fresh earth, pure air, and water* in abundance, the charge of "criminal negligence" so often made by sanitary engineers and members of the medical profession against civic authorities is perhaps too strong a term; *ignorant negligence* is more appropriate.

In these sanitary conventions we hear much about food adulteration, especially milk. This is an important matter, one deserving of your deepest consideration, but putrid sewage is more than adulteration, it is *poison, deadly poison*.

This matter is not intended to be an exhaustive treatise on sewerage, but the writer will briefly describe the different methods of sewage removal and attempt to give some practical suggestions based on the latest modern engineering practice, without introducing any formulæ or professional terms that cannot be easily understood.

"Sewage" in its ordinary sense does not include ashes or kitchen garbage, it consists chiefly of water polluted with a variety of matters, some held in solution, some in suspension. It will be so considered in this paper. All other matters that cannot be burned conveniently should be removed in wheel-barrow or cart. There are four tools which, if frequently and regularly used by each householder would soon do very much to improve the sanitary condition of a city or town; they are the pick, the shovel, the hoe, and the broom.

Mr. Gray, city engineer, Providence, R. I., states as follows in his valuable report on the proposed system of sewerage for that city:

"The cardinal principles upon which the sanitation of towns should be based may be briefly stated as follows:

1. "The water supply should be both pure and abundant.

2. "All excretal filth, domestic refuse, and dangerous waste products of manufactures should be completely removed beyond the limits of inhabited districts, and be properly disposed of before any deleterious putrefactive change shall have taken place in them.

3. "The process adopted for the removal of objectionable matter should be such that the apparatus, channels or rivers by which they are conveyed shall not become foul or communicate any gaseous products of decomposition to inhabited places. No system of sewerage is complete until all nuisances from sewage shall have been prevented.

4. "The scavenging of the town shall be complete and thorough.

5. "The storm water shall be conveyed without damage or inconvenience.

6. "The level of the underground water shall be permanently lowered by means of thorough sub-soil drainage to a suitable depth below all habitations.

7. "A code of effective sanitary laws should be enacted and enforced, and an efficient sanitary inspector should be constantly maintained."

*Systems of direct removal.*—This includes the pail or tub system, the ash closet, and their different varieties and combinations.

In each of these systems the sewage is stored for a certain length of time before removal. From a sanitary standpoint the pail or tub system is least objectionable when contents are removed daily—the earth closet system the least objectionable from an æsthetic standpoint. The earth or ashes used in this last system deodorizes the refuse matter, which may, therefore, be stored for a very long time without becoming offensive. It is yet to be proved by medical science that the compost is disinfected as well as deodorized. The poisonous element of coal gas is perfectly inodorous, and it is now pretty well established that the poisonous elements of the so-called *sewer gas* are in themselves inodorous.