SEWERAGE AND SEWAGE DISPOSAL.

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Main Sewerage.

The question of main sewerage is, perhaps, one of the most important ones affecting the health of any community. Sewage in its composition consists of most of the waste products of humanity. The human body is constantly taking in forms of poison which it has to deal with and discharge in the form of effete matter. Upon the ability of the constitution to handle and combat with these various poisons depends its health state.

Human Waste.

There is a constant flux or change going on in the tissues and frame of the body. It is held that in ten years the whole body has undergone an entire change, has been, in fact, renewed with fresh tissue and new cell formations. Thus in ten years the material part of a whole population has either passed as refuse into the atmosphere or down the town sewers. The waste is represented to a large degree by the carbonic acid the body is giving off by expiration to the atmosphere and by the organic particles absorbed by clothing, removed by washing and by the ordinary digestive processes. This waste has properties of a toxic ptomaine character, which, if they re-enter the human system, act as poisons.

When the air in a room is vitiated it is not the presence of the carbonic acid gas which affects those present. The consequent lassitude, sickness, and headache are due to re-breathing and swallowing particles of effete organic matter of a poisonous character. The measure of the carbonic gas is only an indication of the presence of organic impurities. Now, just as it is necessary to remove a vitiated air as quickly as possible, so is it necessary to remove a vitiated volume of water containing waste products, such as sewage.

What is Sewage?

Sewage represents the total amount of water supplied for domestic purposes after it has passed through the human body, removing with it the internal waste products; also the dirt from surfaces of the body, from clothing, housecleaning, street-washing, grease, etc., from cooking utensils, and, in fact, all the discarded waste which the water supply in passing through the town carries with it. With the sewage is carried all the effete discharges and resultants from disease. Skin scales from scarlet fever and small-pox, bacilli from typhoid and diarrhœa, etc. The whole sum total of the sewage, consisting of a liquid containing a large amount of organic matter charged with poisons and disease germs, in a condition unstable in its chemical combination and most liable to putrefaction. Sewage forms a suitable nidus for the rapid growth of disease germs: it will absorb them, whenever it comes in contact with them. In its midst they will grow by the million.

Sewage undergoing putrefaction produces a dangerous gas, called sewer gas, which may be charged with the germs or spores of disease and carry the infection of disease on its wings.

Sewage coming into contact with milk, milk utensils, food and water poisons them and renders them dangerous, Sewage is a necessary factor in the economy of existence. It has, however, to be dealt with firmly and scientifically removed, totally removed, by the quickest and cleanest method possible to the wit of man.

The Careless Mind.

When a municipality approaches the question of sewerage (or the getting rid of sewage) there is apt to be ^{engendered} a feeling of carelessness, resulting from a ^{common} idea that "anyone can lay a sewer." "There can be no difficulty in laying pipes under ground with a fall so that water runs." So we hear it said, the result being that

[This series of articles when completed will be bound in book form and may be ordered from The Canadian Engineer. Price, 25 cents per copy.—Ed.] many sewerage systems have been put in roughly, improperly, leaky, without sufficient falls, no flushing, no proper supervision, and, it is said, "We never had smells till we got a sewerage system." "Our death rate is now higher since we got the sewerage system." The end of many of these so-called sewerage systems is certainly worse than the beginning.

What can be said of a sewerage system which is practically a disposal system in itself. That is, by means of careless jointing, defective laying, and, perhaps, broken pipes, most of the liquid sewage is escaping into the soil near the houses, near water mains, which may also be leaking, and into which the sewage is drawn when the water is turned off and the mains emptied. A town built upon a sewage contaminated soil, the ground air to the buildings supplied from a sewage contaminated source, the liquid escaping, leaving the solids stranded in the sewers to putrefy, forming elongated cesspools in the streets, supplying sewer gas in abundance at manhole gratings and into dwellings by means of plumbing defects. There is no exaggeration here. Thousands of dollars have been expended to obtain the above results. Plans, complete plans, carefully designed by competent engineers, have been handed over and botched by careless contractors, supervised, if at all, in many cases by some local person with no real experience of good work, but pushed into position by some local influence. In other cases no proper plans have been made, all being left to piecemeal hazard-odd bits done at odd times, no regulated plan, no complete scheme, no specification, and practically no knowledge of good work of any kind relating to sewerage. Every engineer can point to plenty of instances of the above. Many a community in its heart of hearts knows it is so. No one really to blame, no real culpable negligence, but just carelessness and want of real knowledge of the seriousness and importance of the subject, and, perhaps, just a little tendency to sacrifice good work in order to guard the sacred dollar in the safe.

Approaching the Subject.

When an engineer or an authority has to approach the problem of main sewerage there are certain defined points which must be kept in mind. The author will endeavor to deal with these points as concisely as possible.

The Main Principle.

Sewage must be completely removed from the vicinity of the town as rapidly as possible and before time is given for putrefaction to commence. Any structure or appliance which will cause sewage or the solids of sewage to collect is against every good principle of sanitation. Retention of sewage means formation of sewer gas and an admittance that the sewers are not capable of doing their duty.

A Complete System.

No matter whether it is the intention to only lay a short length of sewer, or sewer only part of a town, every such length should be a part of a general system, schemed and laid out on a plan to deal not only with the town's present limits, but also comprising and taking in districts over which the town may have a tendency to extend. As far as possible, before laying out a sewerage system, a common point of discharge should be fixed upon, a point to which the whole of the sewage can be taken by gravitation if possible. Such a point should be well away from the inhabited part of the town, where sufficient land can be easily obtained for disposal purposes in the event of such being required at any time, if not at present contemplated. By the use of judicious foresight in this instance much money can be eventually saved. Every community may take it for granted that at some period or another sewage purification will become a necessity to them.

The Separate and Combined Systems.

A "combined system" of sewerage is one which takes not only domestic sewage, but also all the storm road water and subsoil water which it is necessary to remove from a town. The "separate system" of sewerage is when there are two systems laid down, one for domestic sewage, including roof water and another for road and subsoil water. The separate