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SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

SUBURBAN SEWAGE DISPOSAL.

This forms the title of a paper recently read by Mr. M. J. Quinn before the "Central Railway and Engineering Club of Canada."

The author deals somewhat exhaustively with an installation for buildings and small communities based on the adoption of a septic tank with a liquid overflow conducted into the land below the surface by means of weeping pipes.

The system as described is known generally as that of "sub-irrigation," and has been recommended in the past very extensively by Dr. Bryce, of Ottawa.

We have before us a printed copy of the paper, which is well and usefully illustrated.

There is no doubt but that the system under certain conditions can be usefully adopted.

The so-called "septic tank" is, perhaps, more useful in connection with small installations than elsewhere, because the necessity of frequent sludge removal is partly eliminated. The difficulty connected with a septic tank in private installations is always in dealing with the liquid. This liquid is in a semi-state of putrefaction, contains a large amount of fine solids in suspension, and gives off very foul odors. Distributed over the surface of the land it soon becomes a nuisance.

Sub-surface irrigation, as fully described by Mr. Quinn, is an easy and generally effective method of disposal, granted that the land is friable and that the drainage has no communication with any well or drinking water source.

The addition of air grates at the end of each length of sub-drain proves a great advantage in supplying oxygen to the under-drains, thus hastening and aiding aerobic action.

The author advises an automatic arrangement, depending on a ballcock and float for discharging the liquid into the sub-drains. We are inclined to think that a simple automatic syphon gives less trouble, owing to there being no moving parts.

The adoption of the system depends, of course, as all land treatment systems do, upon land of a suitable character being available. Where such cannot be obtained, aerobic purification can be best effected by the installation of a small percolating filter, which need not be much larger than the septic tank. The sewage is easily distributed over the entire surface of the filter by dripping-trays, such as in the Stoddart system.

The value of sub-irrigation as compared with the latter method lies in the fact that the former does not require frost protection in winter.

THE DRAINAGE OF A COUNTRY HOUSE.

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It is difficult to give an intelligible description of what goes on in a septic tank. In the first place, our knowledge is by no means complete, and in the second place there exists among bacteriologists difference of opinion, but I think I may safely say that there is a great variety of species among bacteria, and that they have different functions to perform, according to their kind. One kind of organism attacks and digests one component in the sewage, and another another, until the whole of the organic matter in the sewage is peptonized, and what has been, from a chemical point of view, a mixture of complex bodies is tranformed into a mixture of much simpler substances. In the process of the transformation, gases are evolved, and in rising to the surface of the liquid, as they naturally do, they bring with them matters in suspension, which form a tough, gelatinous kind of scum over the surface of the tank. This scum is more readily formed in a covered tank, where the temperature is more equal and invariably higher than in an open septic tank, but in both cases the process and the changes which take place are as nearly as possible identical. The ebullitions of gas are intermittent, but in a large tank appear to be so continuous that air bubbles are constantly rising to the surface, and appear like beads floating on the dark water. Where a scum has been formed, the water does not have the appearance described, but in joints and cracks of the crust you can frequently see the formation of air bubbles, and where the air is concentrated in this way it is sometimes possible in an open septic tank to produce a flame by igniting the gas, while from a covered tank gas may be drawn off for illuminating purposes and used as a substitute for ordinary coal gas.

One reason for encouraging septic fermentation at this stage of the purification process is that the breaking down of fatty matter and cellulose, which embraces substances like paper, straw, fibre, etc., is very largely due to the action of the liquefying anaërobes. Notwithstanding what appears to be an established fact, one cannot forget that the disappearance of leaves which fall every autumn from deciduous trees must be due to an organism essentially different from one whose habitat is in darkness, and absence of air. The sewage having been prepared for further treatment is led from the septic tank to the bacteria bed, which consists of a heap of stones or other suitable material, placed so that the tank liquor is allowed to trickle from the surface downwards, thus exposing the drops of impure liquor to the action of microbes occupying the interstices in innumerable numbers, and, if the action is sufficiently prolonged the impurities are practically destroyed, that is, converted into carbonic acid, free ammonia and nitrates.

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* Read before the Institute of Sanitary Engineers.