

other connections; every separate house connection being untrapped on the main line and thus permitting a free flow of air from the sewers through the house plumbing to the outer air or vice versa.

It is only reasonable that each householder contaminating the sewers should also provide a means of ventilating them, and without a doubt this offers the best method of ventilation providing the soil pipes are carried up well above the ridge of the roof of any dwelling, and the plumbing is kept in good condition, for which safeguard a compulsory yearly inspection of the plumbing would be advisable.

The practice of ventilating the sewers at the street level through perforated manhole covers as adhered to by many cities and towns, cannot be too strongly condemned, the nuisance arising from such methods being too palpable to the senses of sight and smell.

Up to within about eight years ago I was a firm advocate of the intercepting trap and the ventilation of sewers at the street level, but later observation has changed my views, and I do not consider that any community adopting these methods to-day can be considered as otherwise than behind the times and disregardful of the most obvious laws of health.

Anyone who has walked along the streets of a city or town where the sewers have been ventilated at the street level must have noticed in winter the dense, unhealthy vapor that arises, and in summer they cannot have failed to have become convinced through their olfactory nerves of the monstrosity of this method and its great menace to health and life.

The inhalation of sewer gas will not of itself bring disease unless the sewage is sprayed in it, but it will undoubtedly lower the vitality of the human frame, and so render the body subject to speedy capitulation to the many forms of disease that we humans are heir to.

By ventilating the sewers through the house plumbing the obnoxious gases are carried well up into the air above the roof tops, each house system acting alternately as inlet or outlet, dependent upon the direction of the wind or degree of temperature, and thus carried far away and purified by dilution.

Disposal Works.—The aim of the provincial authorities is to prevent any septic action taking place at the disposal works, and with this end in view the ordinary septic tank is not countenanced, but plain sedimentation has been enforced in all the systems designed under the new Act up to the present time.

This is a very laudable ambition, as a non-septic effluent can be better treated on the bacteriological filters than can a septic fluid, but I do not see how these conditions are to prevail all the year round with our present designs taking into consideration the extreme severity and duration of our winter months.

Beginning with the freeze-up in November, our winters may be said not to terminate till well on into April, and during that period we experience temperatures as low or lower than 50 degrees below zero.

During this period of low temperature it does not appear to me to be either advisable or feasible to empty the sludge from the sedimentation tanks on to the sludge beds as even if the sludge were thus deposited it would freeze into a solid mass and thus neither drain nor dry, whilst it is more than probable that the sludge pipes leading from the sedimentation tanks to the sludge beds would, when operated, quickly become frozen and fail to accomplish their object.

With fresh frozen sludge being deposited on the sludge beds from time to time during the winter, a great mass would

accumulate which would take a long time to drain and dry after the winter was over, if it ever did dry, and, I am afraid, would materially interfere with and retard the successful operation of the plant.

If, on the other hand, the sludge is allowed to remain collecting in the sedimentation tanks during the winter months, it will become septic, and the professed object of the provincial authorities will not be obtained with the sedimentation tanks as at present designed.

Fresh sludge from a sedimentation tank contains from 90 per cent. to 95 per cent. water, whereas sludge that is septic contains only 80 per cent. water; it is therefore easy to understand that the removal and subsequent treatment of septic sludge entails much less labor and costs considerably less than that of fresh sludge.

Having in mind the duration and severity of our winters and the difference in volume of fresh wet sludge as against wet septic sludge, I am in favor of a tank so designed that the sludge can be retained for long periods and become septic without coming into long contact with the effluent passing through the tank, and the Emscher tank apparently complies with these requirements with its deep sludge well accommodation.

Septic sludge, being viscous and denser than fresh sludge, is much easier to handle, and both drains and dries quicker, becoming under normal conditions spadable in about five days after being spread upon the drying beds, whereas fresh sludge is very sloppy owing to its large content of water and does not become spadable in less than fifteen to twenty days under similar conditions; it has also a tendency to clog and choke the drainage material of which the sludge beds are composed.

In many of the larger European plants the sludge is drained and dried in pressing machines and centrifuges and afterwards pressed into cakes and used for manure on farm lands, or as fill in low lying ground or sometimes burnt; the grease is also sometimes extracted and sold, but up to the present at a financial loss in most instances.

The sludge has but little value as manure and in many cases farmers or others have demanded and obtained payment for removing it from the works.

Personally I am of the opinion that in this province where farmers have not yet attempted to manure the land, that the best and most satisfactory method of disposal of sludge is to burn it in an incinerator after it has been dried upon the sludge beds to a consistency of about 50 per cent. moisture, in which condition it is easily spadable.

For the smaller communities that do not possess garbage incinerators, the dried sludge can be buried in shallow trenches in and reserved for this purpose adjoining the disposal works.

I have spoken at some length on the sludge question, as it is undoubtedly the most troublesome feature to deal with in the modern system of sewage disposal for inland communities, and there is a good sized fortune in store for that individual who can discover some better and more sanitary and economical method of sludge disposal than that which prevails to-day.

Whilst speaking of the sludge it occurs to me that up to the present no attempt has been made to control the fly nuisance that will arise whilst the sludge is being drained and dried upon the beds.

Residual oils sprayed upon the sludge will effectually prevent the fly evil, but at the same time will considerably retard the drying process, and on that account may not be advisable.

For my part, I would favor the construction of a cheap framing around the sludge beds; the openings between the