

dent, Dr. Kenwood, of sewage becoming over-septicized if left too long in a septic tank, resulting in a deposition of colloid matters which interferes with the working of the tank.

On none of these topics must I touch, but there is just one question raised by Dr. Barwise, who brings ingenuity, insight, and exact methods to the study of all sewage problems, to which I should like to allude. He has recently contended that bacterial beds are not correctly so called. They are, in his view, entomological menageries stocked not only with bacteria, but with many varieties of animal life. He does not attempt to classify the animal inhabitants found in biological filters, but believes that in small grain filters, at any rate, the destruction of organic matter is mainly effected by small river worms. As there are about one thousand species of these he does not identify the principal operators, but has recognized the Naididæ and Tubificidæ in enormous numbers, and has satisfied himself that they are extremely prolific and very gregarious. Then there are innumerable Polychata, beautiful objects under the microscope, swimming about in every specimen of the effluent. In the coarse grain filters, on the other hand, there are large worms, leeches, and countless numbers of larvæ, of gnats and flies. The suspended matter in the effluent from these coarse grain filters consists almost entirely of the casts and eggs of worms and of the larvæ of flies. The effluent from the fine filters, besides minute river worms, contains the ordinary water crustacea, such as cyclops and cyprides and fresh water shrimps. There are, too, on the surface of the water hosts of water spiders, and lately Dr. Barwise has noticed centipedes, and on some beds a small, black, jumping insect like a flea, known as the Podura, which is present in such quantities that they can be wheeled away in barrow-loads. Dr. Barwise cannot understand why these comparatively large organisms present in such quantities should have escaped attention, while bacteria which only the microscope reveals have been the subject of concentrated study.

Dr. Barwise's observations and speculations are exceedingly interesting, and open up many and far-reaching vistas of research in connection with sewage disposal. Our filter beds, it appears, are not merely rendezvous for bacteria, aërobic and anaërobic, but an olla podrida of insects, spiders, crustaceans, leeches, worms, and protozoa, all contributing something to the final composition of the broth. We must ask our zoologists to inform us of the life history of each of these, of their food habits and digestic processes, and of their internecine wars, and we must invite our chemists to investigate the changes due to their presence, occurring during the process of biolysis, and the part they play, if any, in the purification of sewage.

In the meantime I think it would be well to continue to put our faith in bacteria, and to trust to their putrefactive and oxidizing power for the breaking down of organic substances in sewage into simpler molecular forms.

## A NEW METHOD OF TREATING SEWAGE.

By K. Imhoff, Engineer of the "Emschergeressenschaft,"  
in Essen, Germany.

(Continued from last week.)

The size of the subsidence tank or basin is solely dependent on the quantity of sewage to be dealt with and the period required for subsidence. No special allowance need be made for possible accumulation since the working need never be interrupted. Neither is it in most cases necessary to make allowance for increase in the bulk of the sewage by rain water; the tanks can deal with sewage diluted by rain from three to five times its normal bulk, the period required for purification being proportionally reduced. The subsidence and septic tanks are collectively no larger than ordinary subsidence plant. Moreover, inasmuch as the circular tanks can have very thin walls, the cost of construction is in most cases less than that of ordinary subsidence plant. The attention required is practically limited to the removal of the sludge drawn from the tanks. The working expenses are

accordingly small, in the absence of all complicated apparatus.

### The Tanks in Conjunction with Bacteria Beds,

Where the water freed from sludge is sufficiently dilute, and can be discharged into a well-regulated watercourse, no further purification is necessary. Otherwise, bacteria beds are provided. In such cases the tanks are used for preliminary purification. The tanks are specially suitable for this purpose, for the reason that the water is not contaminated.

Opinions on this point still differ, however. Nevertheless, the view that it is preferable to supply fresh water to a bacteria bed, as to a river, appears to be gaining the upper hand. The beds are in that case capable of more work—that is to say, they can be of smaller dimensions for given requirements. But apart from this, an important advantage derived from keeping the water fresh lies in the fact that fresh water spread on bacteria beds evolves much less odour than water containing sulphuretted hydrogen.

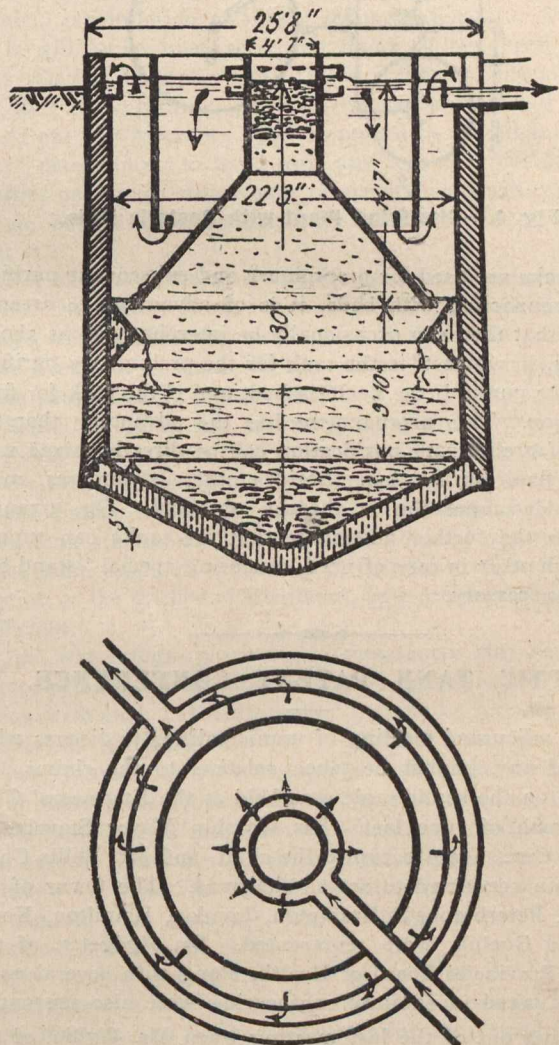


Fig. 3.—Clarifying Plant for Population of 5,000.

In England, too, there is an increasing tendency to avoid the use of ordinary septic tanks for preliminary purification on account of the odours arising therefrom. The known disadvantages of ordinary subsidence works are often preferred. A case in point seems to be that of Machynlleth, dealt with in No. 875 of *The Surveyor*.

It is in cases of this kind that the new system will prove of great advantage, the water being kept fresh and odourless, as in the subsidence treatment, and the sludge being dealt with as satisfactorily as in any septic tank.

In the case of percolating beds, it is usual to subject the discharge from the beds to a process of mechanical purification, in view of the large amount of sludge carried from the beds. The sludge separated by this purifying process is also capable of decomposition and has the same properties as the sludge separated by the preliminary purification. Emscher tanks can be used also for the treatment of the discharge from the beds, but in this case the subsidence tank must be de-