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SEWAGE TREATMENT BY AERATION AND ACTIVATION*

THE AUTHOR TRACES THE DEVELOPMENT OF THE PROCESS—GIVES DETAILS OF CONSTRUCTION AND LAYOUT OF THE BROOKLYN SEWAGE EXPERIMENT STATION.

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(Abstract prepared by the author for *The Canadian Engineer*.)

BY far the most interesting development in methods of treating sewage brought forward in recent years is that known as activated sludge, a name invented by Dr. Gilbert Fowler, of Manchester, England, to describe a process which, although as yet within the range of study and experimentation, has already taken its place among approved methods of sewage treatment, and promises possibly, to occupy the entire field, if the problems connected with it can be solved by a more extensive general experience in its application. It is admitted that there are still many things to be learned about it, and difficulties to be overcome; but it may be said justly, that it gives at present great promise.

It is the purpose of this paper to present, from an engineer's standpoint, a general review of the subject, and point out the progress made up to this time, in a broad manner, so as to invite discussion by our sanitary engineers, and especially those who have been studying its special details.

The essential feature of the so-called "activated sludge" process of sewage purification is the artificial application of well-known natural biological agencies, which, in the presence of an abundant supply of atmospheric oxygen, produce biochemical changes in the organic matter in the sewage, and render the sewage "stable," or incapable of putrefactive changes. This result is obtained by the biological oxidation of the organic impurities which are decomposable. The oxidizing bacteria obtain their food supply and the energy employed in their life processes from the organic material in the sewage which, in the presence of atmospheric oxygen, they rapidly attack and oxidize.

For many years the principal object of sanitary engineers in the design of sewage treatment and disposal plants has been to bring together in the most suitable and efficient manner, the decomposable materials, the oxidizing bacteria, and an abundant air supply for the bacteria.

In America, the Massachusetts State Board of Health was the pioneer, and its work is known throughout the world. In 1890, this board published a special report in which experiments are described which were begun in 1888. This report is generally acknowledged as the

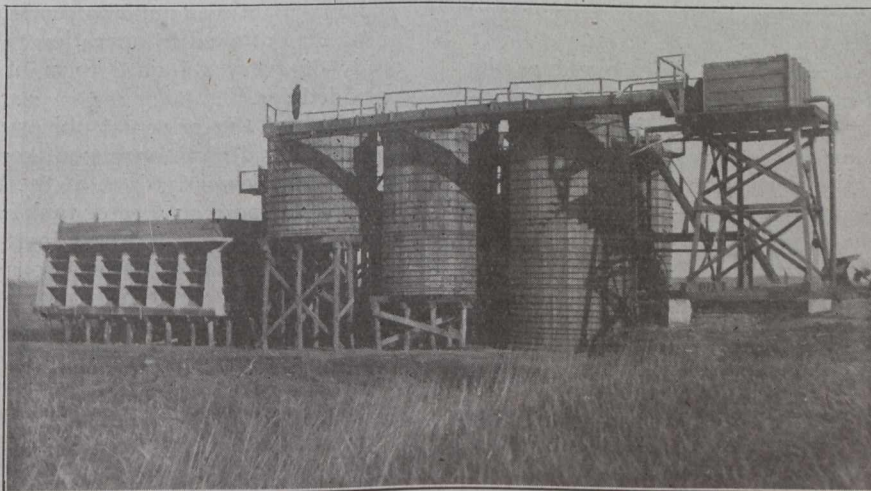
starting point from which biological methods of sewage treatment originate.

It can be demonstrated that the biological process of sewage treatment is essentially the same, whether filter beds, sand filters, contact filters, percolating filters, etc., are used, or a tank in which sewage is subjected to compressed air in the presence of activated sludge. This point has been discussed by Mr. O. J. Wilkinson, of Manchester, England,

who shows that, aside from the mere added effect of the agitation caused by the air in a filled tank, aeration of sewage in the presence of activated sludge is a reversal of the well-known methods of filtration on bacteria beds.

The real problem is to ascertain the most economical method of applying air to sewage, with maintenance of complete circulation of the activated sludge without any formation of dead banks of material, to reproduce in the tank the changes that occur in a percolating filter bed.

The application of air to sewage has been accomplished by various designs of apparatus, among which should be mentioned the method of employing the flowing stream of sewage entering the tank to compress the air used in the treatment, and apply it while flowing and under pressure. A patent covering this method was granted to Cecil C. E. Beddoes by the U.S. Patent Office, August



View from North, Showing Imhoff Tank, Aerating Tank, Etc., at Brooklyn Sewage Experiment Station.

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