

moisture the weight will then be about one-half ton per million U.S. gallons. Dehydration by pressing, centrifuging, heating, gravity, etc., have been either tried or considered. Early in our activated sludge process we realized that there was sufficient value in the sludge in the form of unsaponifiable grease and ammonia nitrogen to warrant its being dehydrated, degreased and dried for fertilizer base. Several samples were sent to fertilizer producers in Chicago who reduced them and reported their worth to be from \$10 to \$20 per dry ton, with plenty of market for all we could produce.

The sludge produced by the process has the general appearance of finely divided sponge, brown in color, and seems to absorb the colloidal matter very rapidly. Highly colored liquor introduced into activated sludge will be decolorized in a few minutes.

It drains out upon the ordinary sludge-drying beds in less than one-half the time of the Imhoff tank sludge, but this dewatering is accomplished differently; the first liquor removed from the sludge passes downward through the bed, upon the surface of which the sludge settles, whereupon the remaining liquor rises on the top of the sludge and must be drawn off. The sludge has no apparent odor.

Its moisture content can be reduced from 98 per cent. to 94 per cent. by pressure due to a 26-foot head of water and its volume decreased 40 per cent.

An interesting feature of the process is the inoculation of the sewage by activated sludge. Mr. Copeland states that "in order to purify sewage to best advantage, activated sludge must be fed to the raw sewage as it enters the tank," and to do this he considers that the sludge should be concentrated by hydrostatic pressure. It is known that sludge from a two-story tank contains less water as the depth at which it is digested increases. Four hours' storage in a 3-in. pipe 26 ft. high at Milwaukee resulted in the moisture being reduced from 98 to 94 per

cent., so that 100 units were reduced to $100 \times \frac{100-94}{100-98} = \frac{2}{6} = 33.33$. The sludge was raised by an air-lift pump. No information is given as to the proportion returned to the sewage inlet. The report, however, states that "there is no necessity of returning more than enough sludge to keep the tank charged with its proper proportion, but in order to secure the proper proportion it was necessary with the apparatus at hand, to return a large excess of treated liquor with the sludge." To return more than this volume forces liquor through the tank at an unnecessarily high rate, with the result that the sewage will get insufficient treatment. On the other hand, if the sludge is not pumped out of the settling basins fast enough it will fill them up and run out of the overflow. In order to avoid these difficulties the discharge from the sludge lift should be run into sludge treatment tanks. Most of the sludge will flow as freely as water, and on the same slope, but the heavier masses of sludge consisting of waste, paper, etc., do not flow readily and therefore the sides of the pipes or troughs must be smooth.

The term "proper proportion" may perhaps be interpreted as the percentage of the tank capacity occupied by sludge, say, 25 per cent. settleable in 30 minutes. Attention has already been drawn to the plan of storing and aerating sludge during the hours of weak night flow, so that it will be in good condition to attack the strong sewage of mid-day.

Despite the fact that there is yet much to learn—and what process is there which has reached its perfect stage of finality?—the activated sludge system of sewage treat-

ment has been established as one which will produce better results than any other known method, excepting possibly land irrigation under exceptional conditions.

Municipal engineers owe much to Messrs. Chalkley Hatton and Copeland for conducting experiments on a large scale to prove the practicability of the process evolved by Messrs. Ardern and Lockett under different conditions.

The writer acknowledges his indebtedness to the above gentlemen and to Mr. John H. Fowler for information bearing upon the important subject under review.

LETTER TO THE EDITOR.

Revision of the Patent Act.

Sir,—Your issue of May 11th contains a letter with suggestions as to the amendment of the Patent Act and improvements in patent practice, made by Mr. W. S. Babcock, of Montreal. With some, at least, of these suggestions we are heartily in accord. The patent and the trade mark branches of the Patent Office will never get sufficient attention as long as they are merely adjuncts of the Department of Agriculture, the head of which is usually someone whose interests and experience are largely agricultural.

The suggestion that patentees be given the option of having their patents subjected to compulsory manufacture or compulsory license, is a good one. The manufacturing section of the act in the past has been more of a nuisance to patentees than of benefit to manufacturers. It may also be advisable to have interferences decided by an official of the patent office, as the proper weighing of the various points which require to be considered in an interference case necessitates special experience, not only in the consideration of evidence, but in the consideration of the various points of the invention in issue. The average arbitrator appointed by the government often falls woefully short in the latter feature. We have not noticed, however, that the interference proceedings in the United States office are very much cheaper than the decision of a Canadian interference by arbitration.

As to the substitution of a continuous term of eighteen years, with a somewhat increased first payment, in place of the present renewal system, there may be differences of opinion. It is often of considerable advantage to get rid of the patents which are allowed to expire at the end of the first six years of their life. It greatly reduces the number of patents that have to be kept in mind when determining the question of infringement. It is quite possible that the provision of extensions of time for payment of renewal fees on the payment of certain fines would meet the requirements.

Our suggestion would be that the government appoint a commission including representatives of the patent office, patent attorneys, lawyers, inventors, and manufacturers, to consider the whole situation and to make recommendations for revision of the Act, improvement in the organization of the patent office, and improvements in patent procedure.

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Per J. Edward Maybee.

Toronto, May 15th, 1916.