that a reduction to ⅛-inch per second is sufficient, and the former belief requires modification.

Fig. 3 illustrates the effect of various velocities of flow with reference to sedimentation. At a velocity of ⅛-inch per second 72.31 per cent. of suspended matter is deposited; at 5-6-inch per second, 69.08; and 1⅔-inch per second, 58.92 per cent.

It is interesting to note that with the velocity at ⅛-inch 70.7 per cent. of the settled sludge lodges in the pocket while 29.3 per cent. is deposited on the floor; at 5-6-inch 51 per cent. in the pocket, and 49 on the floor; while at 1⅔-inch 45 and 55 per cent.

The conclusion which Steurnagel draws from this is that long tanks are necessary for high velocities and short tanks for low.

In constructing rectangular tanks one of the main features aimed at is, distributing the incoming flow as

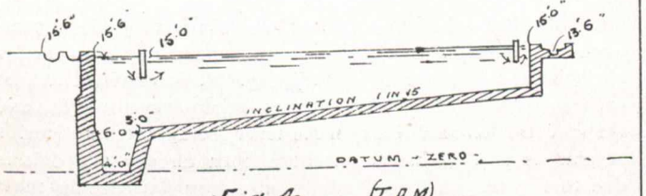


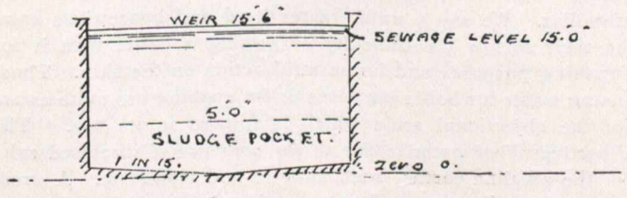
Fig. 4. (T.A.M)

General Construction Relative to Partial Quiescence.

equally over the cross section of the tank as possible, so as to maintain an equal velocity throughout its length.

In computing the area of the cross section, the depth of tank at shallow end is taken, the lower portion is allowed for sludge deposit and at no time should the sludge be allowed to rise above this level, either in septic or fresh sewage processes.

Having arrived at the cross section necessary to provide the reduced velocity flow, the next question to consider is the length of time necessary for the maximum deposit to take. This altogether depends upon the character of the suspended matter in the sewage, and the length of time taken by the sewage in travelling through the sewers, in order to arrive at the outfall works. In every case sewage should be tested as to time required for sedimentation. In this respect Steurnagel demonstrated that an hour and a half period of passage through the tank produced practically the same result as could be obtained in three or four hours. Steurnagel



Figs 5 Arrangement of Sludge Pocket. (T.A.M.)

obtained amounts of sludge per 1,000 gallons of sewage for the following velocities:

Velocity (inches per second.)	Sludge (gals.)	Analysis of Sludge. moisture %	Dry residue %
⅛	4.040	95.57	4.43
5-6	2.474	92.87	7.13
1⅔	1.838	91.34	8.66

It will be seen that a gallon of sludge obtained at the highest velocity contains about twice as much solid matter as a gallon obtained at the lowest velocity.

The above experiments point to short periods of sedimentation for the purpose of superseding screening, which is expensive in maintenance and generally costly. In fact it is now generally being understood that screening is an unnecessary and clumsy method of removal of solids, and its application has been only due to an imperfect understanding of the principals of sedimentation. They further point to the possibility that much slower velocities have been held necessary than are actually required.

It is common to find in septic tanks as low velocities as 1-inch to ½-inch to the minute, but such velocities are not the result of actual experiments having reference to sedimentation, but are only such as may have resulted accidentally by arranging capacities for say 12 hours and 24 hours flow of sewage. The rectangular shape of the tank often being subject to the lay out of the works, independent of any velocity standards.

The knowledge that a velocity of flow of ⅛-inch per second, just ten times greater than 1-inch per minute, is sufficient to produce a deposit of over 70 per cent. of the suspended matter in sewage, may probably have a marked effect in reducing the sizes of sedimentation tank. This is more especially apt to be the case, now that it has been fully demonstrated that no benefit, but otherwise, is obtained by allowing septic action to take place as far as the tank liquor is concerned.

Fig. 4 illustrates the general structure of a continuous flow sedimentation tank, a gradient of 1 in 15 is given to the tank floor, and a sludge pocket shown at the inlet end of tank, from which the sludge may be raised by means of a chain pump.

In order to produce as little disturbance as possible by the inflowing sewage, it is not discharged by means of a pipe, but allowed to enter the tank by flowing over a weir the full cross section of the tank. Any disturbance to the surface of the tank is guarded against by placing a plate or scum board across the tank parallel with and close to the weir. The upper edge of this plate should stand 4 inches above the sewage level and the lower edge be at least 2 feet below the level of the sewage. A good plan is to have the plate made to a depth equal to the shallow end of the tank, and provide vertical openings or slits about 1½ inches wide, thus tending to distribute the inflowing sewage over the whole cross section.

A scum board must also be placed at the outlet end to prevent the discharge of floating matter with the tank liquor.

It will be observed that there are no divisions shown in the tank, the method of dividing a tank into sections either cross sectional or longitudinal is not considered good practice, the object of obtaining equal velocity, free from disturbance by eddies is best obtained by uninterrupted flow from inlet to outlet.

In our next issue we intend to deal with the question of sludge disposal.

(To be Continued.)

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

Copies of these orders may be secured from the Canadian Engineer

6885—April 23—Authorizing the C.N.R. to construct standard trestle of the Niagara, St. Catharines & Toronto Railway.

6886—April 23—Authorizing the G.T.R. to construct, maintain and operate branch line to and into the premises of the Empire Manufacturing Company, Ltd., at London, Ont.

6887—April 23—Permitting the Enterprise Gas Company of Delhi, Ont., to lay gas pipes under the tracks of the G.T.R. at Main Street, Delhi, Ont.

6888—April 23—Authorizing the C.P.R. to construct steel trestle at mileage 95.7 of the Sherbrooke Section of its line.

6889—April 23—Approving tariff of the Quebec Railway Light and Power Company Tariff C.R.C. No. 7.

6890—April 23—Amending Order No. 6616, dated March 22nd, 1909, by striking out the word "west" where it occurs in the fourth line of paragraph 1 of the said Order and substituting therefor the word "east."

(Continued on Page 666.)