the perforated pipes was the best. About 17,000 gallons of sewage were treated with 1.8 cu. ft. of free air per gallon.

The third series of tests, which lasted 35 days, was the most satisfactory. (See Tables I. and II.) There was no sludge present at the beginning and owing to the length of the test at times some of the excess of the accumulated sludge was wasted. No accurate comparison of the sludge accumulation at the end of the series can be made. The maximum amount of sludge was reached last in the tank with perforated pipes. Removal of turbidity and oxygen-consuming capacity was practically the same in all tanks. Measured in terms of removal of ammonia nitrogen and in production of nitrate nitrogen the tanks with filtros plates were decidedly superior. Ammonia nitrogen was entirely removed in the tanks with filtros plates after 17 days. Owing to rains nitrate nitrogen was present in the raw sewage during the early part of the series and continued to increase in the tanks containing filtros plates reaching about 25 parts per million. Practically all of the nitrate nitrogen disappeared from the other tanks. The poor results from the tank with wooden blocks were probably caused by the development of a hole in the tank which prevented the formation of finely divided bubbles. The stability to methylene blue was tested on and after the eleventh day and all effluents from the tanks containing filtros plates were stable for 10 days at 20° C. Most of the effluents from the other tanks were unstable. Nearly 30,000 gallons of sewage were treated in each tank with 3.2 cu. ft. of free air per gallon. The sludges in the tanks with filtros plates settled better and after removal at the end of the series, had specific gravities of 1.013 and 1.022 compared with 1.006 for the sludges from the other tanks.

The results obtained from these comparative tests indicate the superiority of filtros plates as air diffusers over perforated pipes, such as were used in our tests under the conditions maintained. The wooden blocks were difficult to handle though this was caused in part by the faulty design of our containers. Even in the time they were used there was evidence of considerable deterioration. From the results obtained little, if any, difference could be distinguished between the coarse and fine grades of filtros plates. With air free from dust and oil there should be little trouble experienced from clogging of plates.

Dewatering of Activated Sludge

Experiments in drying on sand beds were not successful. Owing to the large amount of moisture in the sludge 98 to 99 per cent., the solid matter obtainable from a foot depth of sludge would be only from ¼ to ½ in. according to the residual moisture content. It was also difficult to separate the sludge and sand. The fertilizer obtained was more or less impure and of decreased value. The sand beds used were 0.01 acre in area and divided into five compartments. Underdrains were overlain with 10 ins. of coarse gravel and 8 ins. of sand. The beds were provided with a canvas cover supported on a frame work so that they could be protected during storms. One compartment was allowed to dry after a single filling, another after two fillings and another after three fillings. In no case were the results sufficiently satisfactory to warrant the use of sand beds for the drying of the sludge and the production of a commercial fertilizer.

Experiments with a filter press with leaves 8½ ins. square operating on a fairly concentrated sludge were also unsatisfactory, it being impossible to obtain a cake of good consistency. Further experiments are to be tried with the hope that better results can be obtained.

Through the courtesy of the Koering Cyaniding Co., of Detroit, a rotary filter was obtained. This style of filter is used satisfactorily in filtering slimes in extracting gold and silver by the cyaniding process. The apparatus consists of a cylinder of filtros plates supported on a perforated steel cylinder, outside of which at a distance of about 1 in. is a solid steel outer shell. The material to be filtered is forced into the interior of the cylinder of filtros plates, the cylinder is revolved and a cake of sludge is built up on the inside of the plates. The liquid filters through the plates into the space between the cylinders. Air pressure can be exerted from the interior to dry the cake, and from the exterior to loosen it. The plates can be cleaned by back-flushing with water. The first trial

Table I.—Summary of Results Obtained in the Comparison of Efficiency of Methods of Aeration Measured in Terms of Ammonia Nitrogen, Nitrate and Nitrite Nitrogen, and Oxygen Consumed

(Parts per million)

Period. 1917.	Ammonia Nitrogen					Nitrate and Nitrite Nitrogen					Oxygen Consumed				
	Sewage.	Effluents A	B	C	D	Sewage.	Effluents A	B	C	D	Sewage.	Effluents A	B	C	D
March 27-April 1.	21	17	17	18	17	.9	1.2	4.0	3.9	3.9	58	26	19	20	22
April 1-6	17	17	16	16	16	4.7	3.9	4.7	6.1	6.3	46	21	18	15	14
April 6-12	16	11	9	8	9	5.1	4.9	4.5	5.9	7.2	50	26	24	19	26
April 12-17	26	30	29	0	0	.3	.4	.3	6.8	10.2	55	32	26	25	16
April 17-22	21	21	21	0	0	1.2	.3	.0	15.0	16.9	..	..	..	..	..
April 22-27	25	24	23	0	0	1.0	.2	.1	25.8	26.0	..	..	..	..	..
April 27-30	22	30	20	0	0	4.5	.3	.0	23.8	24.7	..	..	..	..	..
Average	21	20	19	6	6	2.5	1.7	1.9	12.6	13.6	52	21	22	20	19
Reduction		5%	10%	71%	71%							60%	58%	62%	63%
Results April 12-30 after Activated Sludge was formed.															
Average	24	24	23	0	0	1.7	.3	.1	17.8	19.4	55	32	26	25	16
Reduction		0%	4%	100%	100%							41%	53%	54%	70%

A—Tank with perforated pipes.
B—Tank with wooden blocks.
C—Tank with fine filtros plates.
D—Tank with coarse filtros plates.