A 10-in. galvanized iron pipe connects with each of the three gas chambers and extends 10 ft. above the roof.

To give complete control of operation a 2-ft. concrete channel to carry the sewage runs entirely around the tank and is provided with stop planks, so that the sewage may run through both tanks in reverse direction, through the first tank only or by-pass both tanks. The major part of the sedimentation takes place in the first tank and it is proposed to reverse the flow through the system every week or so in order to equalize the accumulation of sludge. If it should prove that one tank is sufficient for the present population to be served, the second tank may be by-passed and held in reserve until needed. The tanks are located near the site of a proposed public park; for this reason it was considered advisable to cover them.

Operating Results at Winters.—The Imhoff tanks at Winters have not been in operation long enough to give very definite ideas of what may be expected of them, as they were first put into service about four months ago. The operation has been under the supervision of Mr. Luke Gregory, who, although without experience in sewage disposal, has given unusually careful and intelligent supervision. Three progress reports have been obtained from assistant engineers since that time, but no analyses have been attempted. The last inspection was made on September 20, by the writer, in company with Mr. Gregory. The system is completed, but all the houses have not yet been connected and the amount of domestic sewage delivered is much less than that for which the tanks were designed. The effluent from the tanks has been quite clear and comparatively free from solids, except at times some finely divided black humus matter. At first, while the flow was very small, a slight odor might be detected, but this appears to be hardly perceptible at present. During the greater part of the period of operation, only one tank has been in use. Lately a part of the sewage has been diverted so as to enter the outer end of each unit, being taken off at the centre opening. This makes the tanks operate in parallel rather than in series, as was intended.

Bacterial action is decidedly active, as evidenced by the continual rising of large quantities of gas bubbles. Most of these bubbles rise in the centre manhole, which collects gas from the largest portion of the sludge wells. Although gas was escaping in large quantities no odor of hydrogen sulphide could be detected, even close to the open manholes. The heaviest mat was found in the centre manhole of the first tank. This was about 6 ins. thick, the manhole being 3 x 4 ft. All of the other floating solids would probably be not more than six more cubic feet, making in all about 12 cu. ft. of floating solid material in the entire tank. This is a very small quantity compared to the amount of material usually found in the floating mat of a septic tank, and indicates that a large proportion of the solids do not hold enough gas to keep them continually floating.

The mat was similar to that usually found on a septic tank, and when judged by the odors given off was not nearly so offensive. Some of the material from the lower part of this mat was taken out and examined. It consisted of a black homogeneous mass containing very little fibrous material and having little odor other than that suggestive of tar or crude oil. The mat on the side manhole of the first tank was but about 2 ins. thick, similar in appearance to that in the centre. Bubbles were rising here also, but in not nearly such large quantities as appeared in the centre. This was due also in part to the fact that most of the solids fall nearer the centre of the tank, after passing through the slots from the sedimentation chamber.

The sludge deposited in the bottom of the tank has been measured by Mr. Gregory, who found it to be about 2 ft. thick. No sludge has yet been drawn out. Since the capacity of the sludge well permits of an accumulation of something over 6 ft. before this will become necessary, no observations on the character of the sludge from the bottom have yet been made.

It was found that a slight mat had formed on the sedimentation chamber longest in use. This mat was very thin, probably not over ½ in., and its origin has not been definitely ascertained. The slope of the partitions between the sedimentation chamber and the sludge wells is 45 deg., or 1 on 1. It may be that some finely divided solids have remained on this surface for a period long enough for putrification to set in and have bubbles form, causing them to float. Or it may be that, as was observed in the Philadelphia experimental tanks, some solids are contained in the sewage, which are light enough to float of themselves. Gas and scum is so small compared to the amount of sewage passing through that it cannot be a serious defect. Later designs of Imhoff tanks call for slopes of 1 on 1½ for these surfaces, and perhaps with such steeper slopes there would be less tendency for scum to form in the sedimentation chambers.

As will be noted from the description, a cover was placed on the tanks. This was done in spite of the fact that both Dr. Imhoff and Dr. Rudolph Hering of New York considered it unnecessary. In general, a cover is, undoubtedly, not required. The writer, however, believes it better to cover any sewage disposal works operated in close proximity to residences, as there is undoubtedly less odor in any type of works which is covered. At Winters, the pipes arranged for conduction of the gas from the tanks have been brought together and extended so that the point of discharge is now about 30 ft. above the ground. The operator states that previous to this there were, on quiet mornings, objectionable odors in the immediate vicinity of the tanks. This condition was relieved upon the extension of the pipes. The effluent has been concentrated in a closed iron pipe and taken down to the creek bed, where it flows through a channel in the gravel for a distance of about 100 ft. to the main stream of the creek, which is very low at this season of the year. The only odors noticeable about the entire plant were in the 100-ft. channel through the gravel. This could be readily eliminated by diverting the flow of the creek so that the point of discharge of the tank would be under water.

The cover has been found efficient in preventing the use of the tanks as a breeding place for mosquitoes, and the operator has found it desirable to make all openings as nearly tight as possible except for the gas pipes and effluent pipes.

During the summer months a large amount of cannery waste, estimated by the operator as high as 150,000 gals. in 10 hours, was discharged into the sewers, and found its way to the tanks. This material is strongly alkaline from the use of lye in the fruit canning process. It is stated by the operator that upon its arrival at the tanks, sludge decomposition as evidenced by the formation of gas bubbles, ceased. Also that the velocity of flow through the tanks was too high to admit of thorough sedimentation, and that at such times objectionable odors were given off and the effluent was dark and contained considerable suspended solids. Normal action was quickly resumed, however, when the cannery wastes were diverted from the disposal works.

TO UTILIZE LUMBER REFUSE.

Vancouver sawmill owners propose to utilize lumber refuse now being consumed in huge burners at the mills to make electrical power and steam heat, and to offer the same for sale. Application is made to the civic authorities for the necessary permission to lay wires and pipes for transmission purposes. The movers in the scheme say they can offer electricity to the city at ¾ of a cent or one cent per kilowatt.