The floor of the filter is of concrete, trowelled smooth with a fall of I in 30 towards the centre channel, where the filtered effluent is collected and discharged.

Upon the floor rocks of about 9-inch to 12-inch section are laid to admit of free access of air and easy drainage, and provision for an efficient circulation of air through the filter is further obtained by carrying down from above the ground a set of 12-inch diameter inlet pipes which discharge into the base of the filter and are spaced at 25-foot intervals longitudinally around the walls.

The roof of the filter is further fitted with ventilators for discharging the air, so that good aeration and ventilation are obtained.

Sunlight is admitted through windows in the roof, which are kept open in the summer and closed during winter. The action of this type of continuous filter is aerobic and the degree of purification obtained about 98 per cent.

All operating parts of the filter are of easy and comfortable access and an arched passageway runs along the centre of the filter for its full depth, so that inspection of the collecting channel is obtainable at all times with the aid of a covered lantern.

**Disinfecting Channel.**—From the filter the now considerably purified effluent is conducted into a long, rectangular channel fitted at intervals with baffle plates, where, if the circumstances so demand, it is disinfected by a minute solution of calcium hydrochlorite which, by means of the baffle plates, is thoroughly incorporated into the effluent, and the whole fully aerated.

Humus Tank.—From the disinfecting channel the effluent flows into a rectangular tank of shallow depth, divided into two longitudinal sections, where it deposits any humus that it may have carried with it during its progress of purification, and from thence is discharged into a small watercourse in a non-putrescible condition, dangerous neither to animal nor fish life.

The tank is fitted with an overfall weir and also floating arms, and one division can be thrown out of use and cleaned whilst the other is operating.

The time of the passage through the tank is twenty minutes to allow of sufficient period for the disinfectant to act.

**Sludge Drying Beds.**—The sludge drying beds are rectangular in shape, with wide passage ways for the convenience of the workmen who attend to the duties of spreading and drying the sludge and afterwards removing it.

The floors and walls are of reinforced wire mesh concrete to take up the thermal changes, and the floor is laid with a fall of one in ten to the centre to facilitate drainage.

Upon the floor are placed diagonal rows of 4-inch open tile pipes connecting with and discharging into the main connecting channel.

Upon these 18 inches of coarse gravel or crushed stone is placed, surmounted with a six-inch covering of medium sized sand grains, making a total thickness of straining material of 24 inches.

The sludge from the sedimentation tanks and detritus chambers is gravitated to this bed in 9-inch diameter cast iron pipes, and is conducted along the beds in half open channel pipes, from whence it is spread evenly upon the beds in six-inch layers by the workmen and left to drain and dry.

The liquid draining from the fresh sludge is highly putrescible, in contradistinction to that from septic sludge, which is not putrescible, and is conducted by means of the subdrains mentioned to pipes which convey it back to the sedimentation tanks for further treatment.

The sludge, after being dried until it becomes spadable, is removed and buried in shallow trenches upon land reserved for the purpose adjacent to the disposal works. **Conclusion.**—I regret that the time at my disposal in preparing this paper has not been sufficient to enable me to prepare any drawings to illustrate my remarks, but I sincerely trust that I have made the various stages of sewage disposal operation sufficiently vivid by word pictures to counterbalance that defect.

The system explained is, as before stated, emblematical of all the new plants so far installed in this province, the only important difference being that the plants at the cities of Regina and Saskatoon have been fitted with revolving sprinkler apparatus for distribution of the effluent upon the filter beds.

In conclusion I would impress upon you that no modern sewage disposal plant, however well designed, is fool proof, and the success of each individual installation is largely dependent upon the care and skill of the attendants. A log should be kept daily of all the happenings at the works and complete records of temperatures, volumes and analyses.

## CONCRETE PAVEMENTS TAMPED WITH MECHANICAL VIBRATOR.

Concrete pavements, surfaced with crushed granite and compacted to a high density by means of a mechanical vibrator, have been laid in certain cities in Texas. This. method of road building was described by Mr. R. D. Stubbs, contracting engineer, of Dallas, in a paper presented at the ninth annual convention of the National Association of Cement Users at Pittsburgh. A summary of the paper is given below.

Concrete is delivered to the subgrade, after it has been properly shaped and rolled, by inclined chutes from a mixer. The proportions are 1 part Portland cement and 5 parts of aggregate, consisting of sharp sand and gravel. The amount of coarse aggregate passing a ¼-in. sieve should not exceed 40 per cent. nor be less than 33 per cent. The mix is made rather wet.

The surface is brought to the desired shape by means of long-handled floats, and is immediately covered with a coating of crushed granite, graded from 5% to 11/4 in. in size. The surface is then ready for the vibratory treatment. Platforms 20 in. wide, made of 5/8 x 4-in. strips, cleated 1/4 in. apart, are then placed along or across the street and a movable vibrator is rolled over the road, compacting the concrete to a high density. As the work progresses the platforms are brought forward and the granite surfacing behind is immediately covered with sharp sand and watered. Two or three days later the sand is swept off the surface into the gutter with stiff wire brooms and the street surface is treated with Tarvia. Upon the Tarvia is spread a coating of hard stone from 1/4 to 3/8 in. in size. Upon this surface is spread the sand formerly swept into the gutter. The surface is then rolled with a 500-lb. road roller and after the work is seven days old the street is opened to traffic.

Mr. Stubbs states that he employs no bituminous filled joints for the expansion of the pavement, but he does provide for contraction while the concrete is setting by placing on edge on the subgrade at intervals  $\frac{1}{4}$  x 3-in. wooden strips so that these will be buried in the concrete and will occupy the bottom half of the cross section. Within 48 hours after the concrete has been laid, according to Mr. Stubbs, thin, straight lines of relief will appear over the breaker strips. These thin relief lines never exceed 1/16 in. in width. Mr. Stubbs advocates the use of these relief joints only in the case of very dense concrete, but in the case of poured concrete not compacted by vibration he does not favor their use.