Passing on to the removal of the larger suspended solids from sewage, the question of screens arises, and I think it will be found that screening in this country is practically confined to what may be termed coarse screening, intended—apart from the protection of pumps, filter presses, etc.—to remove only the larger solids, such as sticks, rags, corks, and the like, which would otherwise be apt to cause trouble by lodging under valves or sluices. Such coarse screening is to be regarded as a mechanical process of abstraction rather than of purification.

Although the amount of material removed by comparatively fine screens (⅛ in. to ¼ in.) may appear large to the eye, it will generally be found when dried to represent on the average considerably less than 10 per cent. of the total suspended matter present in the sewage, while the impurities in solution are practically unaltered, or may even be increased by the screens.

Comparatively recently attention has been directed in America and elsewhere to what is termed fine screening, by which is meant screens having openings not exceeding ½ in., but usually very much smaller, and which are automatically cleaned above the water line. The object of these fine screens is to remove to a certain extent the finer particles of matter, which, if allowed to remain in the sewage liquor, would otherwise be apt to use up rapidly the dissolved oxygen of the stream into which they are discharged, and their use is only recommended when the screened sewage is passed into a comparatively large body of water well supplied with oxygen. Many of the fine screens and the cleaning devices therefore are very elaborate, and the openings in the screens very small; in one screen, for example, they are only 2 mm. wide by 30 mm. long. The use of fine screens has been advised in several cases lately, *viz.*, Jamaica Bay, New York, Cleveland and many other places where it may be desirable to avoid accumulations of sludge or where the body of water into which the sewage liquor is discharged is large enough to deal with the dissolved impurities and finer suspended matter without offence.

There would seem to be an opening for fine screening under certain conditions in this country, as in the case of large rivers, where the volume and velocity are such as to admit of the discharge of fine suspended matter without injury; it would also appear to be adapted to seaside resorts where bathing is carried on, and where the presence of floating solids would be extremely objectionable. In any case, if fine screening is to be effective, it is essential that the sewage shall be as fresh as possible, and it must be fully recognized that the brunt of the purification will be thrown upon the body of water receiving the screened sewage, while turbidity and putrescibility will be but little affected; moerover, the efficiency of the screening will probably vary seasonably in the case of an extensive sewerage system, according to the temperature. In the case of a very large screening plant abroad, the seasonal percentage removal of solids was as follows: Spring, 18.7 per cent.; summer, 17.3 per cent.; autumn, 27.6 per cent.; winter, 48.3 per cent.

Concerning the removal of solids by gravity. Scant information is available about detritus tanks, both as regards most suitable design and also with reference to means of cleaning them, most designs having a good deal to be desired in this respect. Theoretically, the velocity through these tanks should be such as to permit settlement of the heavy mineral matter, while the lighter organic and mineral matter is carried forward; sewage flows, however, vary very considerably even in dry weather, and it therefore follows that, given a certain optimum rate of "flow through" for a particular sewage, there must of necessity be times, even in dry weather, when the rate of flow through may be either in excess of or below this optimum rate. With small or medium-sized works, by sacrificing a certain amount of fall, these variations could be controlled by a movable weir, enabling the capacity of the tank to be varied at will, and, as a sequence, the rate of flow through. In times of storm a duplicate tank would usually need to be brought into use, and detritus tanks should never be constructed in fewer than two units.

In the case of large treatment works it is advantageous to have ample tank capacity, subdivided into several units, which can be drawn upon as desired. Particular stress should be laid upon so designing detritus tanks as to ensure ample facilities for frequent and thorough cleansing; if drawing down the top water and removing the contents of detritus tanks is not rendered reasonably easy of accomplishment, and a filthy hand ladle process substituted, trouble will follow.

It is during the preliminary stages of sewage treatment that recovery of grease from ordinary domestic sewage appears feasible. Various processes have been placed on the market for the extraction of fatty substance from sewage sludge, but, so far as I am aware, few serious attempts have been made in this country to recover grease from the scum on sewage as it arrives at the works. It is not a question of whether, as frequently stated, recovery of grease is "commercially practicable"; the point is that sewage and sludge from which the bulk of the grease has been removed are rendered far easier of treatment, and better results are consequently obtained at less cost than would otherwise be the case. If something is obtained for the grease, so much the better. Grease renders sewage sludge very reluctant to part with its moisture; when the sludge is used as a manure it hinders sowing and subsequent decomposition; further, when grease reaches land, contact beds or percolating filters, it clogs up the pores of the soil, contact or filtering medium. Much has been said and written about the value of glycerine wasted in fats, but it must be remembered that if the fat is to be utilized for glycerine recovery, acid treatment is inadmissible, an alkali, such as caustic soda, being necessitated.

With reference to continuous flow settlement and precipitation tanks generally, there is a wide field of investigation open, especially in the direction of securing uniform rates of "flow through," and also in working out some means by which the efficiency of tanks can be more accurately determined. The method commonly in use, of expressing efficiency by percentage removal, is open to objection; it is the actual condition of the finished tank liquor which is the real criterion. Particular attention should be focussed upon the vital necessity for handling sludge as little as possible—any saving in this direction saves money—and also on the means to be adopted for drawing off the sludge from the tanks with a minimum of top water, and this can rarely be satisfactorily done without proper "draw-offs" discharging to a line of pipes distinct from the sludge pipes. Unless the sludging arrangements are good, the tanks will be run for two long periods, and it may be observed that unless continuous flow settlement tanks are frequently cleaned out, fifteen hours' flow through is, in most cases, too long, and partial septic action is almost certain to arise in hot weather.

It is quite possible for a portion of the sewage in a continuous flow settling tank to be septic, while the bulk of the liquid is fresh, and sometimes nuisance from smell arises from this cause, the sludge and overlying stratum of liquor becoming quite septic, and stinking when removed from a tank.