The outstanding fact, writes Mr. Frank, is that thus far the experiments have not been successful in demonstrating the feasibility or economy of the process under existing experimental conditions.

In October, 1915, the idea suggested itself, Mr. Frank states, that some form of preliminary treatment might possibly be of advantage. The relation between the biologic oxygen demand of the sewage and the amount of compressed air necessary, it would seem, should bear an almost arithmetical relation to each other. Imhoff tank treatment, exclusive of the cost of drying sludge, may be estimated roughly at $1 per million gallons for the average municipality. It is estimated that air alone cost in Milwaukee $4.45 per million gallons of sewage; this being on a basis of $2.50 per million cubic feet of air. Imhoff tank treatment would need to reduce the oxygen demand only 22.6 per cent. before it began to assume importance. The activated sludge might also thereby be considerably reduced. Estimates from experiments indicate that instead of producing one volume of sludge to 104 volumes of sewage, which was true of the unsettled sewage, there was produced only one volume of sludge for 525 volumes of settled sewage. It is questionable whether activated sludge can be as economically disposed of as Imhoff tank sludge.

Much trouble has been experienced, both with the compressor and with the porous discs. A new compressor has recently been installed and a very ingenious arrangement and design of the disc diffuser has been adopted.

The work at Baltimore may be said to have just started anew with much promise. At Houston, Texas, the experiments have been discontinued and the new plant is under construction. This plant will have a capacity of 18 million gallons per day. The sludge will be applied to land, for the present; no definite plan for dewatering the sludge has been adopted.

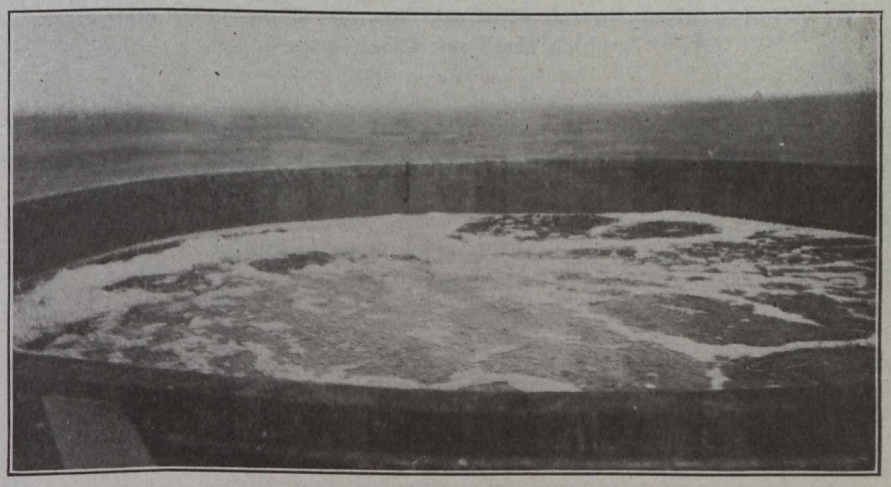
At San Marcos, Texas, an activated sludge sewage disposal plant is in regular service and is doing satisfactory work. The aerating tank is of concrete, 10 ft. deep. It is practically a channel 4 ft. wide and 160 ft. long, divided into four sections, each 40 ft. long. There is a single row of filtros plates down the centre of each section, spaced 3 ft. on centre, with each plate in the bottom of a hopper; a Connersville blower supplies the air, which is under 5 lbs. pressure. It requires only 4 kw. of current to drive this blower. Much trouble has been experienced with the porous plates; some clog, others break. The plant is operating with about 150,000 gallons per day at present, giving an effluent always clear and sparkling, with a relative stability of 99 per cent., according to the methylene blue test, and with a bacterial removal of 98 per cent. The plant is free from odor. The work of this plant is reported as satisfactory, except the trouble with the porous air diffusers. Sludge will be too small in quantity to make dewatering pay. It will probably be disposed of on land.

The activated sludge plant at Edmonton, Alberta, Canada, has recently been put into service. Mr. A. W. Haddow, acting city engineer, states that, as this plant was designed eighteen months ago, when very little was known about the activated sludge process, and as the plant was not solely for experimental study, the precaution was taken of building an Imhoff tank alongside of the aerating tanks. The plant treats the sewage of 4,500 persons. The sewage amounts to 33,000 cu. ft. per day.

The plant has many interesting features. Air is obtained from a Connersville high-pressure blower, which has capacity to spare for the one tank now in operation.

Air distribution is by means of a grid or grill of iron pipe. The tank under experiment has four 1½-inch down pipes, with a valve on each pipe. The pipes are placed 30 inches on centres, and branch into two 1-inch air distributing pipes at the bottom of the tank, one running towards each end, where they are plugged. Each down pipe, with its valves, is an independent unit, and by unscrewing the Dart union, it can be lifted out for examination without interfering with the blowing on the other pipes. The air-distributing pipes are supported from channel irons by means of ⅜-inch rods. In the bottom of the tank there are four lines of these 1-inch pipes, laid 30 inches apart, and perforated on the underside with ⅛-inch holes, separated 3 inches. This gives an excellent distribution of air.

Each of the down pipes above mentioned, which carry the air to these grills, is so connected below the valve and above the Dart union at the top, with a 3-inch high-pressure water pipe, that it and the distributing pipe can be flushed out. In addition to this, by shutting off the water from the high-pressure pipe and turning on steam, the grills can be steamed out, if they become clogged with grease or oil. A check valve is placed in the main air feed line, to prevent water getting into the blower in case of carelessness in operating the valves.



View of Top of Activated Sludge Tank in Operation, Showing the Even Character of the Air Distribution.

The motor is 15 h.p., belt-connected, a.c. 60-cycle, 3-phase. The power consumption at low speed is 4 kw. per hour.

The whole plant is housed in, on account of low temperature in winter. This plant at present operates on the fill and draw plan, but can easily be made to operate on the continuous flow plan later.

Experiments have been conducted at the city of Regina, Saskatchewan. Mr. J. Russell Ellis, acting city engineer, writes that the idea in starting was to obtain data on the adaptability of the process, after which a plant might be designed for the whole city, if the experiments were successful. The results indicate that the process is adaptable to local conditions, and consideration is being given to the design of a large scale unit. Air distribution was effected by means of perforated pipes, covered with canvas.