MUNICIPAL DEPARTMENT

AMERICAN UTILIZATION PROCESS OF GARBAGE DISPOSAL.*

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(Concluded.)

CLASS B.

HOLTHAUS SYSTEM: Bridgeport, Conn. The collection wagon empties its load directly into a dump car standing on an elevator. The car holds one ton and on reaching the upper floor is pushed out upon a track leading between two rows of digesting tanks. A broad funnel fitting into the man-hole at the top of the digester enables the complete contents of the car to be dumped into it at once.

The tank is made of plates of heavy cast iron bolted together, is six feet in diameter and charges five to seven tons raw garbage. Inside is a perforated steel cylinder head fitting snugly and supported from above by a thick piston passing out through the center of the top of the tank. Powerful hydraulic pressure exerted on the piston forces it down onto the contents of the tank.

Below the tank is closed by two 24-inch valves, one above the other and opening into the dryer. Two tanks conected with each dryer.

The charge of garbage is flooded with water, about fifty pounds oil of vitriol added and steam under thirty pounds pressure admitted for five or six hours. The perforated head is now forced down by hydraulic pumps in motion and the grease and water pressed out of the material. These escape through perforated pipes running up the sides (the head is cut out to slide down over them), and also around the bottom. When all the liquid has been removed in this way, the large valves are opened and the charge forced into the dryer by again applying the pressure from above.

The dryer is a steam jacketed cylinder and fitted with a steam reel, fed and exhausted through a hollow shaft. The drying of a charge occupies about four hours.

The grease and water are led to a settling tank where they separate by gravity, and the former is skimmed off by a mechanical device which in action is similar to drawing a stick across the surface. The grease goes to a second tank where air is continually sucked through it to the grate bars under the boilers. The water is led into a cast iron evaporating pan heated with lead coils, where it is concentrated until it has the consistency of liquid glue (about 50% solid matters), some of this being added to each charge of tankage in the dryer. All the tankage is ground in a Denmead mill and screened for shipment. The dryers and evaporating pans are exhausted by a vacuum pump and all vapors are condensed with cold water.

POWTER SYSTEM: Pittsburg and Philadelphia. Wagons deliver the garbage into a pit from where a bucket elevator hoists it into a horizontal conveyor on the upper floor—thence into the digester. These are heated by steam jackets and connected below by an 8-inch valve with the dryer. Two digesters to each dryer. Five tons constitute a charge in the tanks, some water and sulphuric acid being added. The digestion is carried on in the usual way with high pressure steam. After settling a couple of hours to permit the grease to rise to the surface, water is introduced below in order to raise the grease to the level of the draw-off cocks, through which it runs into the storage tank.

After removal of the grease, the valve below is thown open, allowing the sludge to run into the dryer. Here is added phosphate rock and sulphate of potash and sufficient additional sulphuric acid to render the phosphoric acid in the rock "available" as plant food, or chemically stated, to convert the tricalcium into mono and dicalcium phosphate. The drying occupies from 8 to 16 hours. The resulting product is screened and sold as a complete fertilizer.

The dryers are exhausted by a vacuum pump, the vapors passed through cold water, and then to the fiers under the boilers.

CLASS C.

SIMONIN SYSTEM. Providence and Cincinnati. The garbage is allowed to drain of superfluous water on a concrete floor and then loaded into carriages which are at once rolled into the horizontal extractors. These carriages support each a series of trays, made of coarse wire netting, enabling the garbage to be spread in layers of about six inches deep.

The extractors, which the loaded carriages almost completely fill, charge about 8 tons. When loaded the head is bolted over the opening, serving as an entrance for the carriages, and the whole pumped full of naphtha. The naphtha is gradually vaporized by means of a closed steam coil in the bottom, carrying with it the water vapor from the garbage. The mixed vapor after passing off at the top is condensed in a worm cooled by a water jacket and the naphtha and water allowed to separate by gravity. The water is rejected and the naphtha used over continuously.

The evaporation in the extractor is continued until the lowest level of the charge of garbage has been reached, when the liquid is drawn off and replaced by a fresh charge of naphtha. This is continued until the grease extraction is complete and all water is driven out of the garbage by the hot naphtha vapor passing through it.

The mixture of grease and naphtha, with some water, drawn from the bottom of the extractor, is settled, the water run off and the naphtha distilled in a separate still heated by steam. The residue is the grease.

The tankage is steamed, with live steam, in the extractor to drive out all adhering naphtha, and is then ground and screened ready for sale. (The Providence plant, which is the one here described, has been abandoned.)

MERZ SYSTEM. Buffalo. On arrival at the works the load is hauled into a raised platform and backed up to a dump car standing on a track below. The car has a capacity of one ton, and when filled is pushed onto an elevator and taken to the upper floor, where it is dumped into receiving tanks.

These tanks have an opening below at a convenient level with the floor, and here the garbage is raked out and shoveled through 12 inch shafts to the dryers. These are horizontal, fitted with a solid reel and heated by steam jackets. Three thousand pounds contribute a charge, each machine having a capacity of 4 charges or 6 tons in 24 hours. The vapors from the dryers are carried by fans to the open air, there being no apparent necessity for avoiding odors.

After discharging from the dryers, a system of conveyors and elevators takes the garbage again to the upper floor and deposits it in the extractor. Ten tons of the dry material, equivalent to about 40 tons raw garbage, constitutes a charge.

The extractor is a simple iron tank with perforated false bottom on which the charge rests. It is heated by a steam coil below. Naphtha is pumped in to a level with the top of the charge and heated, maintaining a pressure of about 10 pounds, controlled by a valve blowing off into a condenser above. The boiling is continued about 4 hours, after which the naphtha and grease with a little remaining water is run through a continuous separator. First the water is removed by gravity, then the naphtha by superheated steam, the grease remaining. The tankage is freed from adhering naphtha by open steaming, ground and screened. All naphtha vapors pass through one condenser and are recovered for further use.

MERZ IMPROVED. Buffalo. The change made is that digestion by steam precedes the drying. The garbage is dumped directly into digesters fitted with a perforated false bottom on which the charge rests. Steam is introduced at the top under pressure, exhausting through a small vent below the false bottom. The accumulation of water and actual cooking is thus avoided. Five to six tons is a charge and 8 hours is consumed by this operation.

The grease and water drawn off below are separated by gravity and the water evaporated off in a vacuum pan. The solid residue thus obtained is added in small quantities to the dryers. From the digesters the garbage goes to the dryers and thence to the extractors—the process being identical with that last described. The modification introduced in Detroit is of a similar nature, steam digestion preceding drying and extracting as by the old Merz system.

The grade of the tankage produced from garbage varies with the season and the manner in which it is obtained. The following figures, however, probably cover the extremes:

Nitrogen	2.5 to 3.5%
Phosphoric acid	1.5 to 4.0%
Potash	1.0 to 1.5%

* Abstract of a paper read before the Engineers' Society of Western Pennsylvania.