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SANITARY IMPROVEMENTS.

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In Sanitary matters we have to deal with three distinct substances: night-soil, house garbage, and waste water.

In scattered districts it has been the practice to construct pits for the reception of night-soil capable of holding about a cartload. These pits are periodically emptied in some secluded spot usually termed a *depôt*.

As the population increases these spots become scarce, the quantity of night-soil increases accordingly, and as some of our municipalities are unable to find a *depôt* within their boundaries the disposal of night-soil becomes a question of great importance.

In the large centres of population, where practicable, the water-carriage system is usually adopted, as it provides a ready means for the removal of excreta and waste water. Although this system is convenient for householders, its cost being chiefly governed by the length of the sewers, precludes its adoption in sparsely populated districts.

The great objections to this system are that it invariably causes a nuisance at the outlet, and, as ventilating shafts are required for main sewers and soil pipes, there is a continual discharge of sewer gas, which must contaminate the atmosphere.

Localities where large quantities of night-soil are buried or discharged into water, are invariably rendered unhealthy on account of the air and water becoming contaminated with the poisonous gases, disease germs, etc., given off from it.

For this reason the present sanitary arrangements may be said to only remove a nuisance from one locality to another, and before a perfect sanitary system can be obtained a means must be devised for the effectual annihilation of these objections.

Attempts have been made to deodorize night-soil by chemicals; but although this means is of great value in preventing a nuisance for a time, its effect is not of very long duration, and the only effectual way of treating it is by drying. This is being done by the New South Wales Poudrette and Ammonia Company at their works in Rickety Street, Botany, without causing any nuisance.

The night-soil is discharged from the carts into a receiving chamber provided with strainers, through which the more liquid portion passes; this is afterwards boiled and treated with chemicals in order to extract the ammonia. The residuum, which consists of an inodorous liquid, is allowed to pass into the sewer. The more solid portion, which remains above the strainers, is passed into retorts provided with revolving stirrers, where it is dried and heated sufficiently to destroy all disease germs.

The product is a manure called Poudrette, which may be kept in a room without producing any unpleasant smell. This the Company have been selling at £7 per ton.

All vapour and gases arising from these retorts, and the air from the receiving chamber, are carried by pipes into closed ash-pits, and passed through the fire, thus effectually preventing any contamination of the air by the escape of noxious gases.

This Company commenced operations by receiving seven loads, chiefly from Marrickville, on November 6th, 1888, and have since made other contracts. At present they are receiving about fifteen loads per night, which is as much as they can safely take just now owing to the dry weather having affected their water supply, but as the Company is sinking a large well, this difficulty will soon be surmounted, and with a few additions to the plant they will be able to treat thirty loads per night in a short time.

The author may mention that in all this Company's contracts they stipulate that the night-men must deodorize the night soil before carting it, in order to prevent it from causing annoyance on the roads; but after it is deposited in the receiver no nuisance can arise, whether it is deodorized or not. Inspection of the works above described will convince anyone that night-soil can be satisfactorily treated by this means.

The next subject which requires consideration is the method of collecting and conveying night-soil to the works, as sanitary authorities have condemned the pit system for some time past. Most municipalities are now using the pans, but as they are never cleaned but simply carried out and emptied into a cart without any attempt to deodorize they create as much nuisance as the much abused pits; and as the nightmen often change the pans from one house to the next, in order to save time, they form a ready means of spreading disease. Ashes and dry earth are sometimes used in the pans, but both require more attention than the average holder usually gives them. Very elaborate dry earth closets have been designed, but as the difficulty of obtaining dry earth in wet weather, and the frequent attention required on account of the earth rapidly filling the pans, is likely to prevent their general adoption, and therefore they need not be described in detail.

In order to work the pan system satisfactorily, the author has invented an improved pan closet, in which the pan is pressed against the under side of the seat and forms an air-tight joint, the flap is also provided with rubber or other suitable material, and is hung so as to form an air-tight joint when closed, which prevents the escape of any noxious gas. A loose air-tight cover is also supplied, when transporting the pans, kept on with a spring somewhat similar to those used in Rochdale, England. The full pans could be carted to the Poudrette works, where the contents would be emptied into the receiver, and they could be washed out with hot water under pressure with suitable machinery, and returned with sufficient deodorant to prevent any nuisance when the flap is open after use.

By the adoption of this system the pans could be collected during the day without causing any nuisance or inconvenience whatever, and the difficulties attending the conveyance of night-soil may thus be successfully overcome.

Having disposed of the night-soil, we will now proceed to consider house garbage. This material consists of numerous ingredients, the principal of which are animal and vegetable matter in various stages of decomposition, partially deodorized by the addition of dust and ashes. Very little nuisance is

occasioned by this garbage at first, but if allowed to remain until decomposition sets in, it becomes offensive and dangerous to health. It is generally collected in carts by the Municipal authorities, and deposited on parks, or used to fill hollows on roads, and not infrequently to level building allotments; but, as decomposition proceeds, the health of the locality must suffer. House garbage should be disposed of in a manner that would effectually prevent any ill effects, and with that object in view a scheme was included for its treatment in some of the first designs for the New South Wales Poudrette and Ammonia Company; but as this Company received very little encouragement in this matter from municipal bodies, this portion of their works has not yet been constructed. The arrangement referred to consists of a sorting chamber with an asphalt floor, properly drained, in which the carts would deposit their loads. All rags, bones, and articles of value could be removed and separately treated, while all decomposed matter which could not be treated in the Poudrette retorts, would be passed down a hopper into a specially constructed furnace, the result of which would be the formation of a material which would be useful in forming roads, etc. The air from this sorting chamber would be conducted into the ashpit of the furnace to prevent any nuisance arising from this part of the works.

The disposal of waste water is the next subject which requires our attention. This will necessitate a system of sewers or pipe drains, but as the sewage will only consist of kitchen and washhouse slops, together with bath water, there will be very little sewer gas given off, and it may be safely conveyed through a system of pipe drains, and disposed of on a sewage farm. These pipes could be made to follow the formation of the ground, and thus avoid the expensive tunnels and deep sewers often required by the ordinary water-carriage system. The bath water, assisted by syphon-flushing tanks, would keep the pipes clear, even where the fall was slight, as there would be very little solid matter admitted.

We will now consider the cost of effecting the above mentioned improvements.

The Poudrette and Ammonia Company charge 5s. per load of forty cubic feet for permission to deposit. This amounts to three halfpence per cubic foot, and as most of the material they are now treating is brought by nightmen, who pay the above amount, it is evident that the cost of treating by their method is less than the cartage to a dépôt.

The price paid by municipal authorities to nightmen is generally 4d. per cubic foot, and they usually charge the householder about 6d., so that most municipalities make a good profit. Therefore, it is evident that night-soil may be properly disposed of without increasing the present charges.

With reference to the pan system, the removal, washing, and deodorizing, etc., of the closed pans would slightly add to the cost, but there are few householders who would object to pay even 3d. per week for these advantages; but then as this work could be performed during the day, and without the unpleasantness usually attending the nightman's business, the actual cost of carting might be reduced. The cost of treating the dust-box rubbish would be less than 1d. per cubic foot, but the money saved in doctors' bills would more than counterbalance that small outlay.

Regarding the cost of treating the waste water, this could be best shown by a comparison with Mr. Stayten's scheme for the Western Suburbs sewage.

As the storm water and night-soil would be excluded, a system chiefly composed of earthenware pipes nearly following the contour of the ground could be devised suiting the varying requirements of the different municipalities or districts, and as these pipes would be smaller, and require no deep sinking or tunnelling, the cost could be safely taken at half that of the branch sewers required to convey the sewage and storm water to the mains proposed by Mr. Stayten. These he estimates at £830,304, and though Mr. Stayten does not mention the cost of the necessary system of branch sewers, a glance at the map of the Western Suburbs, showing the numerous streets, would be sufficient to convince anyone that their cost would be at least as

much, if not more, than the cost of the mains and sub-mains above referred to.

This would bring the cost of the Western Suburbs scheme, as proposed by Mr. Stayten, to £1,660,600.

The cost of a complete system for carrying off the waste water as suggested, would not exceed £400,000 for the whole of the Western Suburbs, or less than one-fourth of that proposed by Mr. Stayten.

As before mentioned, the cost of treating night-soil will remain the same as at present, and as the cost of removing house garbage will not be affected by the sewage scheme, we may leave its consideration at present.

The actual saving will, therefore, amount to £1,260,600, which, at 4 per cent., is equal to £50,424 per annum.

As there are about 32,700 houses in the Western suburbs, the cost at 3d. per week will amount to £21,250 per annum; therefore, the interest on the amount saved will be more than twice as much as the cost of all the abovementioned improvements.

And the cost of supplying improved pan closets will amount to less than half that of supplying water-closets with the necessary plumbing and draining, which would be required in order to pass the night-soil into the sewer.

It has sometimes been stated by sanitary authorities that the solid matter contained in sewage, only amounting to a few grains per gallon, may be safely disregarded; but when we consider that every 2,000 persons produce one ton of night-soil per day, we find that the present population of the Western Suburbs are producing seventy-seven tons per day, and with the prospective population of 482,600, the night-soil would amount to 241 tons per day. Of this, 212 tons would be deposited on the sewage farm, and it matters little whether we flush this 212 tons down the sewer with seventy-two gallons of water per head, occasionally assisted by a deluge of storm water, which would reduce the amount of solid to a few grains per gallon, still this fact remains, that the night-soil produced by the population of the Western Suburbs would be deposited on the sewage farm if Mr. Stayten's

scheme were completed, and would pollute the air for miles around, thus endangering the health of the city and suburbs.

The method of conveying night-soil with sewage into deep water—either in or outside the harbour—is productive of serious evils, as night-soil usually floats, especially in salt water, and, by a natural tendency, it finds a resting place in the indentations of the shores, and as these indentations are usually pleasure resorts, or centres of population, the evils attending this method are even worse than those described as attending the sewage farm system. The scarcity of fish in and around Sydney may also be attributed to this method of depositing filth into the sea.

Now that the satisfactory treatment of night-soil can be demonstrated, and this at a moderate cost, the author thinks it must be evident to anyone who has given this matter consideration, that on sanitary as well as economic grounds, the Poudrette Works is the proper receptacle.

