The Separate Sewer System.

Joshua Hartzell, in discussing the sewer system of Canton, Ohio, where the separate system is being constructed, writes as follows of the "Combined or Separate Sewer System:"

A sewer system almost the counterpart of our own was built in the city of Schenectady, N. Y., by President Cady Staley of the Cess School of Applied Sciences of Cleveland, Ohio. In his preliminary report President Staley says: "Large sewers of the combined system are built of brick. The brick being porous allow more or less of the sewage to escape into the soil, even if every joint is water-tight, which is never the case. The rough surface of the brick soon becomes covered with a slime of organic matter, which is constantly decomposing. In designing sewers on this system, the size will be determined by the amount of rainfall per hour during storms and the surface to be drained. The volume of rainfall to be provided for is so much more than the sewage that the latter scarcely enters into the computation."

"It is readily seen that ordinarily the sewage will be but a trickling stream in a sewer large enough to carry the storm water. At the street corners are catch basins, into which the storm water passes on its way to the sewer. Here, the sand and rubbish carried along by the current from the street are supposed to settle and remain in the basin while the water passes through a trap into the sewer. In the rush of water during a storm, however, a considerable quantity of the material which is supposed to remain in the catch basin is carried on into the sewer, and this, with other foreign substances, introduced into the sewer either by accident or maliciously, settles on the bottom. These obstructions form a series of small dams in the sewer, and in dry weather the sewage stands in a succession of pools along the sewer, decomposing and sending volumes of sewer gas out of every crevice through which it can escape."

"A theoretically perfect sewer would be one in which all of the sewage would be carried rapidly to its outfall outside the city, so that no time would be given for decomposition. The conduit itself should be smooth, impervious to water, and should be watertight throughout its entire length. It should be flushed at intervals, and so thoroughly that the development of any considerable amount of sewer gas would be impossible. It should be provided with ample means for ventilation, inspection and repair. These conditions are best fulfilled by constructing a sewer of vitrified earthenware pipe, carefully put together with cement, so as to have a smooth, watertight joint, and laid with proper grades and alignment. By proportioning them to carry only the sewage proper, they can be made so small that they can be thoroughly flushed without difficulty. This can be done automatically, either by a tilting tank or by Field's alphon tank. Ventilation, inspection, and repair are provided for by constructing hand holes, lamp holes, and man holes at suitable intervals along the lines of sewers. This is the 'separate system.' Besides the advantages already enumerated, it is much less expensive than the combined system, and can usually be built at from one-eighth to one-third the cost."

Small pipe sewers may be said to have had their birth in London, where certain experiments were made with a view to obviating the cost of the large sewers that had been deemed necessary. Here are several of these experiments:

The sewer in Upper George Street, London, is five and one-half feet high by three and one-half feet wide, draining a built area of forty-four acres. In the bottom of this sewer was laid a 12-inch pipe 509 feet long, and a dam was built at the upper end, thus forcing the sewage of the whole area to pass through this pipe. The velocity of the water in the pipe was found to be four and one-half times greater than on the bed of the old sewer, and its drainage power twenty times that of the old sewer in proportion to its size. It was found that this 12-inch pipe was of ample size to drain the forty-four acres, and, indeed, it was rarely ever more than half full at its head, though the sum of the cross sections of the house drains delivering into this half full 12-inch pipe was equal to a circle thirty feet in diameter.

Another experiment was made with the Earl Street sewer, which took the drainage from 1,200 average size London houses, occupying a paved or covered surface of 43 acres. The sewer had a sectional area of 15 feet and an average fall of 1 in 118, and the soil deposits from 1,200 houses accumulated 6,000 cubic feet per month. A 15-inch pipe was placed in this sewer with an inclination of 1 in 158, and it was kept perfectly clear of deposit. "The average flow from each house was about 51 gallons per day, and apart from the rainfall the 1,200 houses could have been drained by a 5-inch pipe."

Col. George E. Waring, who was the first to recommend for Canton the system which is now being put in, gives an example of the capacity of small pipes in a case where a 6 inch pipe was used to drain one detached house. "One after another as new houses were built new drains were connected with the same pipe, until after a time it was found to be clean and in perfect order, though carrying all the drainage for 150 houses."

With separate sewers complete, regular and automatic flushing is an integral part of the system. Owing to the small volume of contained air, the house connections, carried full bore to the roofs, ventilate the sewer thoroughly. Sewer gas cannot be formed, and if formed cannot enter the house. In a concluding paragraph of a recent report of Dr. James T. Gardner, director of the New York State Survey, and a sanitary engineer of national reputation, the following statement is made: "Those cities which have already spent large sums in completing sewers must either continue to suffer from the evils of sewer poison or incur the further expense of a separate system for carrying sewage only, retaining the large sewers for storm water."