CHAPTER III.

MOVEMENTS FOR REFORM—COMMISSION OF 1875.

For the ten years preceding 1875 the average annual death-rate of Boston was about 25 in 1,000. On April 14, 1870, the Consulting Physicians of the city addressed to the authorities a remonstrance as to the then existing sanitary condition of the city, in which they declared the urgent necessity of a better system of sewerage, stating that it would be a work of time, of great cost, and requiring the highest engineering skill.

At about the same time, and in each of their annual reports thereafter, the State Board of Health referred to the matter, saying that the question of drainage for Boston and its immediate surroundings was of an importance which there was no danger of overstating.

Of such great importance was the matter considered by the State Legislature that, in the special session of 1872, an act was passed authorizing the appointment of a commission, to be paid by the City of Boston, to investigate and report upon a comprehensive plan for a thorough system of drainage for the metropolitan district. This was not accepted by Boston, on the ground that the expense should be shared by the neighboring cities and towns, and no commission was appointed.

In a communication to the City Council (Dec. 28, 1874), upon the necessity of improved sewerage, the City Board of Health pointed out clearly the evils of the existing system, and strongly urged that a radical change should be made. March 1, 1875, an order passed the City Council authorizing the Mayor to appoint a commission, "consisting of two civil engineers of experience and one competent person skilled in the subject of sanitary science, to report upon the present sewerage of the city . . . . and to present a plan for outlets and main lines of sewers, for the future wants of the city." The Mayor thereupon appointed as members of the commission Messrs. E.
S. Chesbrough, C.E., Moses Lane, C.E., and Charles F. Folsom, M.D., and in December of the same year their report was submitted.

As was to be expected from the professional attainments and reputation of these gentlemen, the report contained a comprehensive and exhaustive statement of the defects in the existing system of sewerage, and of the causes which had produced such a condition of affairs, and finally recommended for adoption a well-considered plan for remedying present defects and for providing for future needs.

The commission stated, as essential conditions of efficient sewerage: first, that the sewage should start from the houses, and flow in a continuous current until it reached its destination, either in deep water or upon the land; and, second, that the sewers should be ventilated so that the atmosphere in them should attain the highest possible degree of purity. To quote from the report:—

The point which must be attended to, if we would get increased comforts and luxuries in our houses, without doing so at cost of health and life, is to get our refuse out of the way, far beyond any possibility of harm before it becomes dangerous from putrefaction. In the heat of summer this time should not exceed twelve hours. We fail to do this now in three ways:—

First. We cannot get our refuse always from our house-drains to our sewers, because the latter may not only be full themselves at high tide, but they may even force the sewage up our drains into our houses.

Second. We do not empty our sewers promptly, because the tide or tide-gates prevent it. In such case the sewage being stagnant, a precipitate falls to the bottom, which the slow and gradual emptying of the sewers, as the tide falls, does not produce scour enough to remove. This deposit remains with little change in some places for many months.1

Third. With our refuse, which is of an especially foul character, once at the outlets of the sewers, it is again delayed, there to decompose and contaminate the air.

As a result of this failure to carry out the cardinal rule of sewerage, we are obliged to neglect the second rule, which is nearly as important, namely, ventilation of the sewers; for the gases are often so foul that we cannot allow them to escape without causing a nuisance; and we compromise the matter by closing all the vents that we can, with the certainty of poisoning the air of our houses.

1The catch-basins, too, in the course of the sewers, serve only to aggravate this evil, and should be filled as early as is practicable.
In the opinion of the commission there are only two ways open to us. The first, raising more than one-half of the superficial area of the city proper (excluding suburbs) is entirely out of the question, from the enormous outlay of money which would be required, — more than four times as much as would be needed for the plan which we propose, and which consists in intercepting sewers and pumping.

There are in use now in various parts of the world three methods of disposing of the sewage of large cities, where the water-carriage system is in use:—

First. Precipitation of the solid parts, with a view to utilizing them as manure, and to purifying the streams.

Second. Irrigation.

Neither of these processes has proved remunerative, and the former only classifies the sewage without purifying it; but if the time comes, when, by the advance in our knowledge of agricultural chemistry, sewage can be profitably used as a fertilizer, or if it should now be deemed best to utilize it, in spite of a pecuniary loss, it is thought that the point to which we propose carrying it will be as suitable as any which can be found near enough to the city, and at the same time far enough away from it.

The third way is that adopted the world over by large cities near deep water, and consists in carrying the sewage out so far that its point of discharge will be remote from dwellings, and beyond the possibility of doing harm. It is the plan which your Commission recommend for Boston.

On Plate III is reproduced a portion of the plan accompanying the report of the commission. The plan shows the routes of the main, intercepting, and outfall sewers recommended, and the proposed locations of the pumping-stations, reservoirs, and outlets. It will be seen that two main drainage systems were proposed, one for each side of the Charles River; that on the south side having its outlet at Moon Island, and that on the north side discharging at Shirley Gut.

The former system was designed to collect and carry off the sewage from all of Boston south of Charles River and from Brookline; the latter was to drain the Charlestown and East Boston districts, and also the neighboring cities of Cambridge, Somerville, and Chelsea. The two systems were identical in their general features. These were: intercepting sewers along the margins of the city to receive the flow from the already existing sewers; main sewers into which the former were to empty and by which the sewage was to be conducted to pumping-stations; pumping machinery to raise the sewage about 35
feet; outfall sewers leading from the pumping-stations to reservoirs near the points of discharge at the sea-coast, from which reservoirs the sewage, accumulated during the latter part of ebb and the whole of flood tide, was to be let out into the harbor during the first two hours of ebb-tide.

The cost of the proposed main drainage works, as estimated by the commission in its report, was:

For the territory south of Charles River ... $3,746,500
  " north " .................. 2,804,504

Total ......................... $6,551,064

The commissioners' recommendation met with very general acceptance. But, as was to be expected, a certain amount of opposition to it was encountered.

One remonstrance against the adoption of the proposed plan, which was presented to the City Council by a number of estimable citizens, may be of sufficient interest to cite, because it is a type of the kind of objections which are often urged against plans for municipal improvement, however carefully considered by the most competent experts:

The undersigned respectfully remonstrate against the adoption of the system of sewerage proposed in Report No. 3 of this year. We believe if carried into execution it will prove not only ineffectual, but destructive to the health and prosperity of the city. . . . Of late years the cost of many, if not most, of the public works has greatly exceeded the estimates; in some instances, it is said, two or three hundred per cent.

Should this new system exceed the estimates to a like extent, the amount would be augmented to between fifteen and twenty millions of dollars.

But we do not believe it (flushing) will, or even can, be made to perform that end in an effective or satisfactory manner; because we understand, by the report, that the inclinations of the sewers will afford a flow at a minimum rate of only two miles an hour, so that it will be almost impossible to prevent the glutinous slime and putrefactions from constantly gathering and adhering more or less to the sides and bottoms of the sewers and drains, and as constantly exhaling the deadly gases on every side.

. . . . It will likewise be borne in mind that the thick mass of liquid corruption within the sewers and drains must be drawn along to their up-hill or final ascent of thirty feet and over, and kept in motion and delivered at the distant outlets on the bay, by means of enormous pumps and machinery worked by steam-engines, . . . . for a stoppage in the oper-
ations of such an extensive system for only a day or two, along the low lands and other parts of the city, would almost inevitably result in serious maladies and other evil consequences. . . . Will not the exhalation and odor (from the storage reservoirs) blown by ever changing wind here and there along the wharves, upon the shipping and back upon the land, create a nuisance so offensive and unhealthful as to become intolerable? No provision seems to be devised to prevent such emanations or their baleful consequences. In these noisome reservoirs the contents must ever be exposed to the sun, the storms, and the inolemency of the weather.

In the severity of winter they must become as frozen as the water in the bay or along the shores; and as often as they are converted into ice there must be an entire stoppage of the works. . . . Such reservoirs and outlets might be reduced to ruins in any future day of hostilities—either foreign or domestic—should such hostilities ever occur, the effect of which ruins would be the fatalities of the plague. . . .

There is now but a single system before the authorities, although there are not less than five different systems in Europe alone. . . . It is hereby requested that the same be postponed, and that a reward be offered for the best plan for sewerage relief . . . and that such plans be referred to a commission of citizens . . . with power to give the reward for the best plan.

Other remonstrants thought that city sewage had a great manurial value, and should be so utilized as to be a source of revenue; still others considered the proposed scheme extravagant, and advised temporary palliative measures.

What prevented these remonstrances from having much weight was that, while criticising the proposed scheme, they either suggested no alternative plan, or else failed to show that the method which they themselves recommended would remedy the existing evils.

As a compromise the City Council inclined to adopt the recommendations of the commission in so far as they referred to the territory south of Charles River, which included those portions of the city which suffered most from ineffective sewerage. Application was made to the Legislature for authority to construct works in general accordance with the recommendations of the commissioners, and an act, approved April 11, 1876, entitled "An Act to empower the City of Boston to lay and maintain a main sewer discharging at Moon Island in Boston Harbor, and for other purposes," was passed.

The subject had been referred by the City Council to a Joint
Special Committee on Improved Sewerage, and in June, 1876, this committee reported, recommending the adoption of the system devised by the commission, and that surveys and estimates be made for the work, and also that the feasibility of an outlet at Castle Island be considered.

By an order approved July 17, 1876, the sum of $40,000 was appropriated for the purpose of making surveys and of procuring estimates for an improved system of sewerage for the City of Boston, on a line from Tremont Street to Moon Island, and also on a line from said street to deep water east of Castle Island.

A few days later the City Engineer, Mr. Joseph P. Davis, appointed the writer principal assistant, in immediate charge of the survey and investigations, which were at once begun.