

by the unhealthy emanations therefrom, and so fall easy victims to any prevailing disease, besides been subject to the class of complaints peculiar to such localities.

Our present system of drain inspection, while filling a want, has a tendency to aggravate the state of affairs just alluded to, as drains or sewers, as now laid, are as tight as a bottle; in fact, they must be so from end to end, or else they will not be passed. Now, while this is quite right and proper so far as that portion of the drain or sewer in the house is concerned, I think it is a mistake as regards at least a portion of the sewer, from the line of the outside of the dwelling to the main sewer. Here some provision should be made for the free escape of the water from the surface of the earth. I have frequently seen house drains laid without cement, the parties laying them giving as a reason for not cementing the joints that the locality was swampy and they wished the surface water to escape by the open joints; and I think the evil likely to result from the open joints of a drain under such circumstances would be in a measure neutralized by the good derived from draining the soil, although I by no means advocate the adoption of such a plan. But I would suggest that all sewers laid in the houses and for one or two lengths outside the dwelling be tightly cemented, as is at present the rule. After that I think it would be as well to leave the bottoms of the joints open and fill in round them with gravel or broken stones. That would prevent the earth being washed into the sewer, but would at the same time allow the free escape of surface water. I have heard that there is some provision made in the main sewers for the removal of the water from the soil, but I have no personal knowledge of the arrangement. There should certainly be some plan adopted, especially in our low-lying localities, that would allow for the free and rapid escape of the water from the earth. The best plan, and one that has been adopted with the best results in other cities, is to fit a separate system of subsoil drainage in all localities where the necessity is indicated. Over 14 miles of these drains have been laid in New York with the best results.

There are various systems of subsoil drainage, some of which might perhaps be made a portion of our sewer system for use in localities where such drainage is required; but this is a subject I am not in a position to write definitely upon, my intention being only to point out one defect in our more recent system of laying house sewers, and to suggest one cheap and practical remedy for it that could be adopted and carried out in all parts of the city without adding to the present cost of such work. Something of the kind is absolutely necessary in all localities, especially as the custom of building houses with basements more or less below the surface is becoming more general every day, and no matter how dry the locality may be naturally, in the time of heavy rains, or during the rapid thaws peculiar to climates like ours, such basements will be damp and unhealthy unless something is done to provide a means for the rapid escape of surface water.

CHAPTER III.

Position of Sanitary Apparatus.

As the position of the various sanitary apparatus in connection with dwellings has a great deal to do with their effectiveness, I will endeavor to lay down a few general principles that may aid persons about to build or put in improved sanitary appliances to place them in such a manner that good working is secured and the least annoyance from smell or derangement of the mechanical parts is avoided.

The next great requisite besides good workmanship and materials is light, and therefore all water-closets and similar apparatus should be so placed that the fullest benefit from that greatest of all sanitary agents, the sun, is obtained. Closets and bath rooms should always be so situated that they can be provided with windows opening directly into the outer air, thus securing a proper amount of air and light, without which it is impossible to maintain them in a proper state of sanitary effectiveness. I never knew a water-closet that was imperfectly lighted to give perfect satisfaction.

The practice of locating water-closets in the interior of a dwelling, like a cupboard, is altogether wrong. Where it is impossible to obtain the necessary amount of room convenient to the outer walls, the following plan, adopted by some of our leading architects, gives excellent results: The bath-room and closets are placed on the top flat, and are lit by means of a skylight, which is so arranged that the sash may be easily opened so that ventilation at all seasons of the year will be effected. This plan is applicable to most dwellings, the only exceptions being very high buildings, and in those there is not usually that want of space that would prevent a suitable room being provided convenient to the outer walls. In houses intended for the use of small families it is best to have the water-closet, bath, &c., in one room. Where a large number of persons occupy the same building it is necessary that they be separate, and that access be had to them by separate doors.

Where it is impossible to adopt any but what I call the "cupboard plan," the apparatus should be so located that it may be well illuminated by borrowed light and ample ventilation be provided for from the ceiling. The ventilator should be so arranged as to be flush with the ceiling, and the pipe from the bell mouth-piece let into the ceiling should be carried up through the roof. (See sketch.)

Another important matter to be looked to in locating sanitary apparatus is security from frost. In our climate the extreme cold always produces a plentiful harvest to the plumber, and while he gets some small profit thereby, he never fails to get a large amount of polite and sarcastic abuse, as it is the prevailing opinion that the plumber is in league with the elements to draw money out of people's pockets, while in reality the blame rests in many cases with those who are responsible for locating the various apparatus in such positions that in a climate like ours it would require little short of a miracle to pre-

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