

Essential Features in the Design of Sanitary Drinking Fountains*

THE Committee on Plumbing of the American Public Health Association has had insufficient time to prepare a detailed final report upon the subject of the Design of Sanitary Drinking Fountains, as a thorough study of this subject would require circularization of the manufacturers, schools, and public health authorities, to secure comprehensive information as to the nation-wide aspect of the subject. It is desired at this time, however, to present a progress report.

There appears to be a lack of appreciation of the sanitary significance of certain features of the design of drinking fountains, because frequently improperly designed units are installed in schools, railroad stations, and other public places, where in most cases the equipment has been carefully studied before selection. The possibility of infectious diseases of the respiratory tract being transmitted by the use of insanitary drinking fountains has been demonstrated. A vertical jet fountain with an exposed nozzle may be likened to a common drinking cup, which has been condemned by practically all public health agencies. At present, therefore, it appears that both sanitary and insanitary fountains are available to the public; that a public health problem exists; and that apparently on the part of public health authorities there is a lack of appreciation of the necessity for controlling and supervising such fountains. It is very appropriate that the American Public Health Association use its influence in bringing the essential features in the design, construction and operation of sanitary drinking fountains to the attention of its members, the manufacturers of such equipment, and the public.

A committee of the American Water Works Association, similar to this, reported on this subject in 1924 and concluded as follows:

1. All types of drinking fountains with vertical jets are to be condemned.
2. Most types of drinking fountains with slanting jets are to be condemned.
3. To be sanitary, drinking fountains should conform to the following specifications:
 - a. The jets shall be slanting.
 - b. The orifices of the jets shall be protected in such a manner that they cannot be touched by fingers or lips, or be contaminated by droppings from the mouth, or by splashings from basins beneath the orifices.

* Report of the Committee on Plumbing, presented to the Public Health Engineering Section of the American Public Health Association at the Fifty-eighth Annual Meeting at Minneapolis, Minn., October 1, 1929.

- c. The guards of the orifices shall be so made that infectious material from the mouth cannot be deposited upon them.
- d. All fountains shall be so designed that their proper use is self-evident.

Section 61 of the Railroad Sanitary Code of the U. S. Public Health Service reads as follows:

If drinking fountains of the bubbling type are provided in any railway station, they shall be so made that the drinking is from a free jet projected at an angle to the vertical and not from a jet that is projected vertically or that flows through a filled cup or bowl.

It will be noted that this portion of the railroad sanitary code conforms with the above mentioned conclusions.

Careful consideration by the committee of the requirements in the design, construction and operation of drinking fountains whereby such structures may be in reality sanitary, indicates that the following details should be considered.

1. The fountain should be constructed of impervious material, such as vitreous china, porcelain, enameled cast iron, other metals, or stoneware.
2. The jet of the fountains should issue from a nozzle of non-oxidizing, impervious material set at an angle from the vertical, and at an elevation above the edge of the bowl, so that the end of the nozzle will not be flooded in case a drain from the bowl of the fountain becomes clogged.
3. The end of the nozzle should be protected by non-oxidizing guards to prevent the mouth or nose of persons using the fountain from coming into contact with the nozzle.
4. The inclined jet of water issuing from the nozzle should not touch the guard, thereby causing splattering.
5. The bowl of the fountain should be so designed and proportioned as to be free from corners which would be difficult to clean or which would collect dirt.
6. The bowl should be so proportioned as to prevent unnecessary splashing at a point where the jet falls into the bowl. Self-cleansing anti-splash rims are recommended.
7. The drain from the fountain should be connected to a separate waste pipe.
8. The water supply pipe should be provided with an adjustable valve fitted with a loose key or an automatic valve permitting the regulation of the rate of flow of water to the fountain so that the valve manipulated by the users of the fountain will merely turn the water on or off.
9. The control valve should be operated preferably by knee or foot action to avoid possible hand contamination.
10. The height of the fountain at the drinking level should be such as to be most convenient to persons utilizing the fountain. The provision of several step-like elevations to the floor at fountains will permit children of various ages utilizing the fountain. Elevations may be difficult to provide, however, at fountains recessed in walls.
11. The rate of flow and the pressure should be such that the water will not splash over the bowl. It should be at a rate not less than $\frac{1}{2}$ gallon per minute and at nozzle pressure not exceeding 5 pounds per square inch.

12. The waste opening and pipe should be of sufficient size to carry off the water promptly. The opening should be provided with a strainer.

Obviously, the control and supervision of public drinking fountains should be delegated to local health authorities. It is the committee's impression, however, that few local ordinances on this subject have been promulgated. In certain instances, however, boards of education have specified in their building standards what types of drinking fountains must be installed in approved school buildings. It is felt, therefore, that this committee might well prepare specifications for sanitary drinking fountains for the guidance of members of this Association.

The conclusions of the committee of the American Water Works Association given above indicate that the essential features of sanitary drinking fountains are sloping jets which are so located as to be above the level of the water draining from the bowls. Many of the so-called sanitary drinking fountains available at present do not fulfil these requirements. In fact, the vertical jet type fountain seems to be the most popular. It is necessary, therefore, that publicity be given to the essential features of design of these fixtures.

The use of sanitary drinking fountains involves several secondary problems, such as location, water supply, and cooling. It would seem a relatively simple matter to locate drinking fountains properly, and yet such fountains have been observed in toilet rooms, vestibules, baggage rooms, and isolated in improperly lighted hallways. It is not felt that the mere location of a drinking fountain is of great sanitary significance; yet it is apparent that the education of the public in matters of cleanliness and hygiene will be hindered by the inference drawn from observing such structures in toilet rooms or similar locations. Esthetic considerations must be considered likewise.

It goes without saying that the water obtainable through drinking fountains should be of satisfactory sanitary quality. The pressure of the supply is also of considerable importance, because if the pressure is insufficient the rate of flow of the water is too slow to produce the desired size jet, making it difficult to secure water. This deficiency may be caused by undue resistance to the flow of water by the jet and control valve of the structure, or to low pressure on the distribution system. If the pressure is too high, the jet is too strong and water is splashed over those using the fountain. If, on the other hand, the pressure is insufficient, the jet may not reach the proper height and there will be a tendency for those desiring water, especially children, to secure it by placing their hands or small utensils in the bowl of the fountain. Frequently valves are provided on fountains for adjusting

the rates of flow, to provide the desired size jet. Automatic pressure control valves are preferable, if not necessary, with slanting jet fountains, as the pressure of the water supply varies throughout the day.

Drinking fountains are also subject to the limitation imposed by the necessity of cooling a relatively large volume of water, because warm water is not attractive to the public. The quantity of water flowing through a drinking fountain is much in excess of that which would be used were individual drinking cups available, so obviously the amount of ice necessary to cool the water issuing from drinking fountains is greater than otherwise would be the case. It is felt that this feature is one of the salient reasons why drinking fountains are not so popular with the public as they were expected to be by those interested in providing sanitary means of securing potable water. Mechanical refrigerating equipment is available, however, for cooling the water. The cost of such installations is about twice that of equipment for cooling with ice. Many of these units, therefore, are being installed. Sulphur dioxide and other gases are being used as the refrigerating agents.

It should be emphasized that the design of this equipment should be such that the gas will not enter the water supply of fountains in case of leaks; otherwise sulphurous acid or other compounds would be formed in the water. Obviously, the fountains and refrigerating equipment should be designed and installed in such a manner that cross connections are not formed between the water supply and drainage systems.

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DISCUSSION

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ONE of the early studies demonstrating the transmission of communicable diseases by means of insanitary drinking fountains was undertaken by Pettibone, Bogart, and Clark, at the University of Wisconsin, in 1914.¹ They studied an epidemic of septic sore throat at this university which was quite definitely associated with certain drinking fountains then in use. As a result of their studies, they recommended the slanting stream type of fountain. During the year 1917,