

CHAPTER TWO

DRAINAGE

Syllabus.—Characteristics and brief description of the manufacture of drain pipes, including bends, junctions, channels and taper pipes, gullies and interceptors. Setting out and construction of drains. Drainage systems for small buildings; inspection, interception and ventilation.

SEWAGE DISPOSAL.—In addition to rain water, the waste and refuse required to be disposed of from houses and other occupied buildings include (1) liquid wastes from sinks, lavatory basins and baths, (2) excrement and (3) ashes and household refuse.

Where there is an inadequate water supply, such as in certain rural districts, the rain water is usually collected in galvanized iron tanks and used for household purposes, and fixed receptacles known as *privy middens*, *earth closets* or *ash closets* are provided for excrement, ashes and other refuse. Another objectionable but less insanitary form of accommodation existing in certain districts, including a number of large townships, consists of *pail closets* or *tub closets* in which movable receptacles for faecal matter are provided, ashes being received in small dust bins. This is known as the *dry* or *conservancy system* of sanitation.

The best system, now in general use, is known as the *water-carriage system*. This provides for the admission to and removal by pipes of the liquid wastes from sinks, baths, etc., and excreta. These combined wastes and excreta are called *sewage*.

A complete sewerage or drainage system consists of a network of pipes conveying sewage, the smaller pipes being connected to larger ones and these ultimately combining to form what is called a *main outfall sewer*.

The method of disposal of sewage depends a good deal upon the location of the district. Thus, that from a coast town is simply disposed of by continuing the outfall sewer some distance on the sea bed and allowing the sewage to discharge into the sea during the ebb-tides. If a tidal river is conveniently accessible, the sewage may be discharged into it after it has been passed through a settling tank or received similar preliminary treatment. Otherwise the outfall sewer is continued to the *sewage disposal works*, where the sewage is treated and rendered innocuous. One form of treatment, known as the *activated sludge system*, consists of passing the sewage through a screen and a settling tank prior to admitting it to a large rectangular tank where it is agitated by compressed air admitted at the floor level. In another method the sewage after being screened and settled is sprayed over a *percolating filter* consisting of a 6-ft. deep bed of gravel or similar material. Another method, now being gradually superseded by the activated sludge system, consists of the admission of sewage to one or more *contact beds* of gravel or broken bricks, etc.; where it is allowed to remain for several hours. If only a comparatively small system, the sewage, after preliminary screening and settling to eliminate as much as possible of the solid matter (called *sludge*), may be distributed over land. After being treated by one of these methods, the purified liquid or *effluent* is discharged into the nearest watercourse. In each of these systems the sewage is rendered harmless by the action of bacteria and oxygen.

In the absence of a conveniently situated public sewer (see next column), and where no nuisance is likely to occur, the sewage from a country house may be conveyed to a *septic tank* (similar to the inspection chamber shown in Fig. 31, but with the outlet

at the same level as the inlet and several feet above the floor) or "cesspool" and then allowed to percolate through the soil (provided it is gravel or is otherwise suitable) or passed over a small filter bed of clinker, etc.

In some districts the rain water is kept separate from the sewage, one set of pipes taking the former and another the sewage; this is known as the *separate system*. Most local authorities, however, adopt the *combined* or *single-sewer system*, in which one set of pipes takes both sewage and rain water.

The channels or pipes which convey sewage are called *drains* or *sewers*. The essential difference between a drain and a sewer is concerned with ownership. A sewer belongs to a local authority, who is therefore responsible for its maintenance; a drain is the property and responsibility of an individual. Briefly, according to the Public Health Act, 1875, a drain is a channel by which sewage is conveyed from a single house or premises within the same boundary; if it serves more than one house, the channel is a sewer. Much litigation has resulted in determining whether pipes were drains or sewers, and whilst the above is a broad distinction, it may not apply in districts where local authorities have obtained special powers under private acts or have adopted provisions under the Public Health (Amendment) Acts.

DRAIN PIPES AND TRAPS

Drain pipes and traps are made of clay or shale and cast iron.¹ When made of the former they are known as *stoneware* or *fireclay* or *earthenware* pipes. These terms are often loosely applied. The clay from which stoneware pipes are made is found in this country in the south and midlands, and fireclays are obtainable in the north. Both produce drain pipes and traps of first quality. Generally, the term earthenware is applied to drain pipes and traps which are made from clays used chiefly for the manufacture of bricks, and the quality is variable. In the British Standards Specifications, Nos. 65 and 539—1937,² the term "ware"

¹ Cast iron drainage is detailed in Vol. IV.

² Extracts from these are made by courtesy of the British Standards Institution, 28 Victoria Street, London, S.W.1.