

the dwelling. The basement should extend beneath the entire house, and should, if subdivided, be provided with doors connecting all its subdivisions. Windows of sufficient size should be placed in the exterior walls of the basement, extending nearly to the top of the wall, so as to permit the entrance of light and the free circulation of the air.

Frank L. Packard, an architect, of Columbus, Ohio, says:

"The excavation for the foundation of the house should be made at least one foot larger on all sides than the walls to be built within the excavation, and trenches should be excavated at least 8 inches below the basement floor. These trenches should be made about 6 inches wider than the walls of the foundations. Extending around the outside wall, and on a level with the bottom of the trenches, lay a 3 inch soft tile drain, with proper fall to carry off any water that may come down from the surface. Fill the trenches with good coarse concrete the full width and depth of the trenches. This is known as the footing-course—one of the courses of masonry at the foot of the wall, broader than the courses above. The walls of the foundations may be of stone, brick, tile or concrete. In any event, they should be laid in mortar composed of good, sharp, clean sand and cement of good quality, all well bonded together, and all joints slushed up."

The foundation is intended to serve not only as a firm support to the building, but also as a barrier to the moisture and the damp air of the soil. Illuminating gas, escaping from leaking mains, has been known to enter a house by the basement. Besides, the air of the soil occupies the upper layers of the soil and fills all the interstices—as far down, at least, as the surface of the ground water. Decomposition and putrefaction are constantly going on in the soil, and the gases arising from these processes diffuse themselves through the soil. To prevent the entry of ground air or other deleterious gases into a basement, the late Colonel Waring, of New York, an eminent engineer, said:

"One of the safest materials for a cellar bottom and for the external packing of foundation walls is a clean, smooth, compact clay, which may be beaten into a close mass, and which has a sufficient affinity for moisture always to retain its retentive condition, for when used in the damp atmosphere of a cellar or about a foundation, it seems to offer a good resistance to the passage of impure air. In the cellar, of course, it may be covered with concrete for cleanliness and good appearance; but 6 inches of clay, well rammed while wet, will impede the movement of air to a degree with which ordinary cellar concrete can furnish no parallel. When clay is not available a good smearing of asphalt over the outside of the foundation wall and a thick layer of asphalt between two thicknesses of concrete for the bottom of the cellar will afford a com-