

Plumbing.

HOUSE DRAINAGE AND SEWERAGE.

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The introduction of water into houses and the system of drainage necessary to carry off waste, all of which comes under the head of plumbing, has become a matter of importance, inasmuch as great danger to life and health arises from gases generated in the sewers and cesspools, which we feel safe in saying, in a majority of cases, find their way into dwellings in consequence of the careless and unscientific manner in which this kind of work is done. This is, perhaps, not to be wondered at, when it is considered that in most cases this matter is entrusted to the mechanic who offers to do it for the least amount of money. The builder fails to appreciate the danger to which the occupant of the house, when finished, will be subjected in consequence of the unskillful arrangements of pipes, traps, &c. Ignorance in a matter the result of which is so frequently fatal to life, may justly be termed criminal. In order to arrive at a better appreciation of this important branch of mechanics, we desire to explain, in a simple manner, our views as to what is essential to safety in all cases where house drains are connected with sewers.

First essential: Every vertical soil or waste pipe should be extended at least full size through the roof. No traps should be placed at the foot of vertical soil pipes to impede circulation. Traps should be placed under all sinks, basins, baths, wash trays, water-closets, &c., and as near to these fixtures as practicable. All traps under fixtures, whenever practicable, should be separately ventilated, in order to guard against syphonage. Such vent pipes should not branch into a soil pipe below where any drainage enters it. In some cases it is preferable to carry it to the outer air independently. Rain-water leaders should not be used as soil pipes, and when connected with house drains they should be made of cast iron in preference to galvanized sheet iron or tin, there being less liability of corrosion. Joints should be gas and water-tight, to preclude the possibility of drain air entering open windows. No safe waste should connect with any drain, but it should be carried down independently to a point where the discharge would indicate the existence of a leak or any overflow above. No waste from a refrigerator should be connected with a drain. Unless the water supply is ample, so that it will raise to every part of the building, insuring at all times the proper flushing of fixtures and traps, a cistern should be provided, into which the water will rise at night, or into which it may be pumped. Said cistern should be large enough to hold an ample daily supply, and be kept clean, covered and properly ventilated. The over-flow pipe from it should never be run into any drain under any circumstances. The supply for drinking water should not be drawn from it, but from a direct supply—i. e., direct from the street main.

Water-closets should not be supplied direct from street pressure, or by a pipe from which branches are taken for drinking water. Where the water-closets are preferred to those that are supplied from a small cistern immediately over them, then the supply should be taken to a storage tank, from which it can be conveyed to the valves on the closets, thereby ensuring an equable pressure and securing more reliability in their working.

All drain pipes within a house should be of metal in preference to stoneware, owing to the liability of the latter to crack and the difficulty of keeping the joints tight. It is best to run them along the cellar wall or ceiling with a good incline. They should never be hidden under ground, as there leaks will not be perceptible. In some places it is common to paint pipes white, so that any leakage will show itself to the most careless observer. All drains should be kept at all times free from deposit; and if this cannot be effected without flushing, special flushing arrangements should be provided, so as to effectually remove all foul matter from the house drains to the public sewers. All drains should be laid in a straight line, with proper falls, and should be carefully jointed and made water-tight. No right-angled junction should be allowed.

A drain passing under a dwelling house should be constructed of cast-iron pipes with lead calked joints, laid so as to be readily accessible for inspection. Whenever dampness of site exists, it should be remedied by laying subsoil drains, which should not pass directly to the sewer, but should have a suitable break or

disconnection. Water supply and drain pipes should be concentrated as much as possible, and not scattered about a building. Horizontal pipes are objectionable.

Plumbing fixtures should not be hidden behind walls and partitions where their condition is never apparent. They ought to be made easily accessible and so situated that any leak will be readily detected. In no case should lead waste pipe be connected to iron pipe with cement or putty. Connection can be made by the use of a brass ferrule or thimble, one end of which should be caulked into the iron, and the other soldered to the lead, or a good and more economical plan is to turn the end of the waste pipe over a ring of some metal and caulk into the iron pipe. Without claiming to have exhausted this subject we have endeavored, and hope we have succeeded in our endeavors, to make easily understood the fundamental principles which should be observed in the arrangement of soil, waste and ventilating pipes, in order to secure immunity from danger by reason of allowing the poisonous emanations from sewers to pass freely into dwellings. Next in importance we remark that care should be exercised in the selection of plumbing materials as regards quality, especially water-closets and traps. The former should be so constructed as to positively prevent the back-flow of foul air or sewer gas; and the traps of such kind and shape as will be least likely to be emptied by suction or syphonage. In fact, all modern fixtures and appliances for the convenience and comfort of our homes should be thoroughly understood practically and scientifically, and so constructed that it shall be impossible for any evil to arise from sewer-drains, water-closets, basins, traps, &c. So many contrivances are based upon this one idea, it surely seems that all of them should answer the purpose of pure sanitation. Diseases caused by foul air that can be prevented requires one very essential condition, i. e., cleanliness, and to become clean, all filthy matter must be cared for without offence. Now, the question is, how can this be accomplished effectually and economically? The different inventors of sanitary appliances have as many modes as there are inventors. For the purpose of bringing such articles and appliances before the public, the New Jersey State Board of Health proposed to make a public exhibit of appliances for perfecting house drainage. Upon conferring with the New Jersey State Agricultural Society (it being partly supported by the State), it was arranged to have an exhibition of sanitary appliances in full operation at the Annual Fair at Waverly. Inventors and dealers in sanitary appliances to some extent responded to our circulars, and so made the exhibit a good beginning to an important yearly display. The Board of Health not having any funds to erect the proper buildings, water supply, &c., necessary to show water, sewer and plumbing arrangements, by solicitation of said Board, E. Dunn & Bro., practical plumbers and sanitary engineers of Newark, N. J., undertook, at considerable expense to themselves, to provide for this part of the exhibit. With great diligence they prepared some specimen plumbing, as well as a complete system of house drainage, with drain and trap ventilation. It was put in full operation, in such a position that every part could be seen, the water being supplied to a tank by a Rider atmospheric pumping engine. The whole sanitary exhibit was very carefully and critically examined by a committee of ten experts, comprising professors, physicians, civil engineers, &c. For the purpose of assisting the public to comprehend how house drainage should be done, we present the system and plans as thus shown.

The diagram of this exhibit is presented herewith, and shows that a trap is placed outside of the house (which should be in a vault, of easy access for the purpose of cleaning), and close to this trap, next to the house, a ventilating pipe carried above the roof. The soil pipe is carried full size through the roof.

In connection with each line of waste and soil pipe there is a circulating air or main vent-pipe running independently to the roof, and above the soil pipe, the main vent. A branch is connected from each trap on that line, thus maintaining an easy circulation, it being impossible to syphon the traps. To understand the practical working of currents of air through these pipes, the committee had them bored, which, by the application of a lighted match, fully demonstrated the direction and force of the air currents.

It is to be hoped that from year to year various plans of house drainage, sewerage and ventilation will be thus exhibited.

The exhibit was visited by a large number of persons in and out of the State, who manifested a great interest, and were greatly pleased to have a chance to investigate a system in practical operation. The matter of house drainage and ventilation is not intended to be confined to dwellings or houses we live in, but relates to all places where people congregate or are employed, whether churches, workshops, schools, stores, depots, cars, &c.

* From the report of the New Jersey State Board of Health for 1879.