

land drains unjointed except with collars of muslin to prevent earth or vermin entering pipes. The piping should be placed about two feet below the ground, and discharge into a larger pipe which should be trapped before connecting with the outside or main drain. As it is imperative that this trap should always remain sealed, it will have to be kept so by some automatic means. It is recommended, however, that instead of such drainage, the cellar be secured from damp by a flooring of concrete or such material as may be considered expedient.

Where leader pipes carrying rain water are to connect with the outside drain, they will require to be trapped with a deep seal trap to secure against evaporation, but should the heads of these pipes be remote from, and above windows and other openings to the building, then, it is considered, the traps may be dispensed with. A leader pipe should not be used to carry away any foul or other wastes from the building.

Soil pipes should be of iron, or glazed earthenware socketed pipes jointed with tar cord or cement. They should be carried five feet beyond the outside wall of the building, and there connect with the outside stoneware drain, which will discharge itself into the main drain or cesspool. In the event of the soil pipe running near a well from which drinking water be obtained, it would be desirable to continue the iron or glazed stoneware pipe well beyond it, and in the case of stoneware pipe, surround it with two feet of clay puddle, so that there may be less chance of leakage and consequent fouling of water. The soil pipe should be carried in as direct a line as possible, its full size, up through the roof a sufficient height and left open. If thought expedient, it may be protected from the weather with a cap placed some little distance above it. Should the main sewer be of large capacity and well ventilated, it will not be imperatively necessary to trap the soil pipe, but if such should not be the case, or the house drain discharge into a cesspool, then a half S trap should be introduced into the soil pipe at a point near where it leaves the building, the same being provided with a proper inspection and clean out hole and cap. If possible it will be better to keep the soil pipe above the cellar floor, and support same on thick piers or with iron hangers. In the event of a trap being used, then there should be a fresh air inlet provided on the inside of the trap, and the mouth of such air supply pipe should be placed in such a position that it may not be choked with snow or rubbish. Four inches will be large enough for most soil pipes, but they should not be above six inches.

Water closets should be placed as far as possible in well ventilated rooms with windows opening to the outer air, and not in darkened and out of the way positions where sufficient light and ventilation cannot be obtained. A ventilation pipe should be carried from or near to the ceiling above the roof, and in order to secure a constant vacuum in the room, so that foul air may be prevented from escaping to passages or adjoining apartments, a ventilating cowl should be attached to its head. Each fixture should be provided with a seal retaining trap with proper means for cleansing, and if a ventilation pipe be necessary from same, then it should be carried as directly as possible up to and well above the roof, and should be enlarged to at least four inches before passing through roof, and be left open at top. Drip pipes from lead safes under fixtures should not be connected with any soil or waste pipe, but should be made to discharge either over, say, the kitchen sink or in some place in full view, so that leakage may be at once noticed and repaired. Each fixture should be provided with a flushing tank, as nearly over it as possible, to secure a sufficient and constant supply of water.

Waste pipes from bath tubs, wash basins and sinks, should never be trapped immediately below the outlet of the fixture, and the pipe carried to the soil or main waste pipe. Should there be a separate waste pipe system, then the main waste pipe should be ventilated by carrying it well up above the roof, and the same should be enlarged to say four inches before passing through the roof and be left open at the top. Overflow pipes from these fixtures should be connected with the waste pipe above and never below the trap. The traps should be provided with proper clean out attachments. Waste pipes from ice boxes and drinking fountains should not be carried directly into any soil, branch or main waste pipe, but should discharge

into a safe or sink, which should itself be trapped and waste pipe carried as above described.

Water pipes should be so laid that in the event of needed repairs or otherwise, they can be readily emptied, a draw off trap should be provided in the main supply pipe at the lowest point, and a stop cock immediately inside the building and on such branches from the main pipe as may be considered necessary or desirable. Water pipes in buildings should be fixed in positions least exposed to frost, as in the event of a pipe bursting from want of such precaution, considerable damage may be done before the water can be drawn off and the repairs made. It is recommended that there be as few fixtures placed in a building as possible, consistent with convenience, especially water closets, as unless these are kept in constant use and the traps full by daily flushing, there must always be a liability of unhealthy vapors arising from them. It would be as well to keep them out of sleeping apartments and dressing rooms, and to place them only in special apartments devoted solely to their use.

It is desirable that urinals should not be placed in private dwellings, and where it is essential that they be provided, they should be fixed in some well ventilated and isolated spot. The efficiency of plumbing may be said, in a general way, to consist in sound piping of proper size and material, sound jointing and efficient trapping; with regard to the first, all pipes should be tested as to their strength and soundness before being placed in the building, and after they are fixed, the junctions made, and all supposed to be complete, they should be again tested by one or more of the various methods now adopted, to ascertain if the whole system be secure against the emission of liquid or sewer gas. The material for piping has not so far been touched upon but the writer considers that iron or vitrified stoneware for soil, and iron for waste and supply pipes will be the best to use. Short branch wastes or water pipes may be conveniently of lead. In glancing over the foregoing, the writer fears that some of his remarks may be considered somewhat dogmatic, but he hopes that his readers will excuse him on the score that it is his belief that if the few suggestions offered be carried out in an intelligent manner, due consideration being given to the arrangement of piping in each particular case, that a satisfactory system of plumbing will be the outcome.

### INSPECTION OF PLUMBING IN TORONTO.

EDITOR CANADIAN ARCHITECT AND BUILDER.

SIR,—Now that the city has a new engineer, and the re-organizing of the works department is in progress, it is hoped the plumbing department will not be overlooked. The complaints of the master plumbers and the public who have business there are very numerous. The amount of time wasted in obtaining the necessary permits and inspection of works is a serious matter, and demands the immediate attention of the city officials. As matters are now conducted, the time between giving notice for inspection and the appearance of the inspectors is any where from three days to three weeks, just as it suits the convenience of the inspectors, and often workmen have to be kept waiting for days because the inspectors has not been around to pass the job. If these men really have so much work that they cannot be more prompt, the master plumbers should demand and the city should appoint more men. In my opinion a great deal of valuable time is wasted every day by the inspectors in the office. They are supposed to be at the city hall at one p. m. every day to report, receive instructions, &c., and by the time they have examined plans and specifications and done considerable gossiping, it is often three or half past before they leave to commence their afternoon calls, and as they (being city officials) do not work after four or five o'clock, very little is done. It seems to me that this could be in a great measure remedied if some competent person who understands plans, &c., was placed in the office to give advice on matters of drainage and plumbing work, so that when the inspectors come in, they would not have to parley with about a dozen vexed and dissatisfied citizens, but take their orders from the clerk or chief inspector, and go about their work.

Persons presenting a plan and specification are told that