

vent the frost from injuring the work. This is the first great cause of trouble from frost, and in most cases the plumber has no say in the question, but must obey the mandates of those employed to look after such matters. The reasoning of the latter persons may be, with exceptions, well expressed by the following: "It is a pity to waste that nice room by using it for a bath room and closet. Here is a corner that will do well enough, and you can put that room to a more useful purpose." I ask what more useful purpose is there than to aid in keeping the health of the family. But I am digressing. I hope, however, to have pointed out one preventable cause of frozen pipes.

Never run pipes on an outside wall if it is at all possible to avoid it. If unavoidable, run them on a board blocked out from the wall, put

easily accessible. Where the pipes need to pass upward to the upper stories, a box should be put round them, beginning in the earth below frost and carried up to the story above the cold of basement. This box should be at least 2 inches larger than the pipes, which are so supported that they do not come directly into contact with its sides. Outside this box another should be placed with 4 inches of space between it and the inside box. This space must be filled with some non-conductor, but the inside box must contain nothing but the pipes and confined air. I have known pipes placed in very exposed positions completely protected from frost by this method.

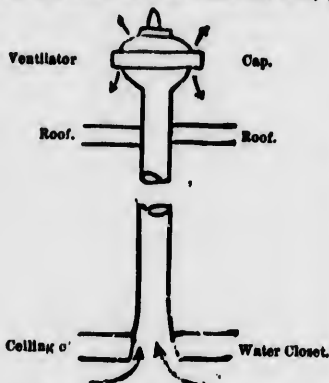
To run pipes so that they may be emptied by shutting off a suitably arranged stop-cock is a very effective plan, provided it is attended to; but the very fact of its requiring constant attention makes it an undesirable plan for general use. Besides, there are in all dwellings pipes that are so situated as to render their drainage a matter of some difficulty. It is much the best plan, where it is at all possible, to so place the different pipes and apparatus that no special attention is required in order to keep them in effective working order.

It is desirable to place the different plumbing apparatus in such situations that a disarrangement of them may not seriously damage the more important household decoration. A water-closet or bath placed directly over a handsomely decorated parlor ceiling is certain sooner or later to cause a great amount of annoyance, as the most perfect work cannot last forever, and outside of ordinary wear and tear, which can in some measure be guarded against by the skillful mechanic, there is the carelessness of the occupants of the building to contend against, which is quite beyond the control of the plumber's skill, and is more frequently the cause of trouble than would generally be supposed.

Carelessness in the use or abuse of the bath tub and its fixtures is a fruitful source of trouble and expense. The large faucets and small overflow pipes make the overflow of a bath tub a serious matter. Careless servants, careless people, and children ignorant of the damage caused by overflowing are fruitful sources of inundation and damage. Such accidents, however, are liable to happen in almost any family, and those who place their apparatus where the playful freaks of childhood, the carelessness of servants, or their own forgetfulness causes the greatest possible amount of damage, have only themselves to thank.

Kitchen sinks should always be placed where there is plenty of light, and should not be made of wood, but of iron or slate, as the wood absorbs the water, and is sure to be the cause of more or less unpleasant odor. The space under sinks should not be boxed or cupboarded in. The sink should be supported on legs, leaving the space under it easily seen and so likely to be kept clean. The pipe under the sink may be boxed to such a height as will secure it from injury.

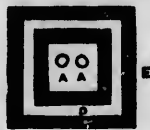
Wash-tubs should invariably be of porcelain, slate or marble, not wood, as in most houses these articles are only used one day in the week, and



(SILING VENTILATOR NECESSARY IN ALL CLOSETS.

boxes between the floor ceiling, and fill them with some non-conductor. This cuts off the drafts that are generally found under floors, as the box containing the pipes acts as a chimney and causes the prevailing drafts to set in the direction of the pipes they contain. The boxing and packing between floors should always be done. The boxes covering pipes should be so made that they can be easily opened. Then, in extremely cold weather, they can be opened to allow the heat of the house to get at the pipes. Another method is to have the boxing pierced with holes at the top and bottom so that heat may circulate freely. These openings may be covered with ornamental gratings.

Water Pipes placed in cold basements should be buried so deep that frost cannot reach them,



A A, pipes in confined air space; B, inner box; D, non-conductor; E, outer box.

this being the only certain plan. The stopcocks should be inclosed and covered so as to be