

My fourth head refers to emptying the pipes of the water contained in them. If a house is very carefully piped with this object in view, and good grades given to all pipes leading to the faucets fitted for emptying them, this may be done; but as this method requires constant

remarks as to the best means of preventing them from freezing, which they frequently do in unoccupied buildings (I never knew it to occur in an occupied dwelling) when the proper precautions have not been taken to prevent it. I will endeavor to explain the way in which these

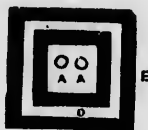


Fig. 4.

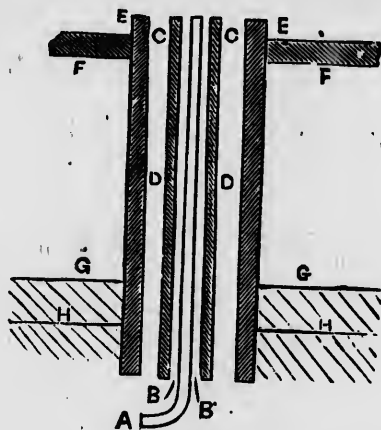


Fig. 5.

A A, pipes; B, space in inside box; D, space between outside and inside boxes filled with non-conductor; E E, outside box; F F, floor of upper stories; G G, ground line; H H, frost line, or line of greatest depth to which frost will penetrate.

watching and attendance, and to forget only once would render a large outlay fruitless and result in perhaps great damage, I cannot recommend it for general adoption for dwellings. In stores, stables and outbuildings, by adopting the hydrant principle, it is very effective, and is accomplished by having the stop and waste faucets buried below frost underground, and a rod extending therefrom that has to be turned every time it is desired to draw water. This can be so arranged as to permit of water being drawn from a faucet in the usual way during the summer, while in the fall the ordinary faucet must be left fully open and the handle removed to prevent its being shut, and the water turned on and off only by means of the rod or key attached to the stop and waste faucet. It must be borne in mind that in shutting off water with the intention of emptying pipes, it is necessary to open the various faucets throughout the building to admit the air, or the water will not run off. It is also a good plan to blow forcibly into some of them. All unoccupied houses should have the pipes they contain carefully emptied in the fall. This should only be done by a plumber, or some one who thoroughly understands what is required, as there are various cisterns, traps, water-backs, &c., that it is not possible to empty by simply opening the ordinary faucets.

As the system of pitching roofs to the centre and running the down spouts or leaders through the building in connection with the plumbing work is becoming somewhat extensively adopted, it may not be out of place to make a few

pipes generally become frozen. After a spell of very severe weather there is apt to be a sudden rise of temperature, and it will be readily understood that the temperature of the air in a building that is carefully shut up will not rise at the same rate as the outside air during a sudden change. Thus, it is quite possible that while it is warm and rain is falling outside, the air in the building may still be several degrees below the freezing point. Now, as the water begins to fall on the roof and trickle down the leader pipe it begins to freeze to the sides, and it does not take long to fill the leader pipe with ice. Then the usual bursting takes place or the roof is filled to flooding, and damage to the building is sure to result. Those having charge of unoccupied buildings that are fitted with inside leader pipes should always open doors and windows on any sudden rise of temperature, after a cold snap, in order to equalize the temperature of the building with that of the outer air, although this means must not be depended upon as a sure preventive from damage. The first great requisite for safety is to have the down pipe drop perfectly straight from roof to drain. (The latter must be untrapped in every case,) as any bends in such pipes, especially near the roof, are certain to cause trouble, because snow, &c., falling into the pipe, is arrested at such bends, and will soon cause a general chokeage. Even running water is partially arrested by a bend, and ice will speedily begin to form. The next important point is the size of the pipe; it should never be less than 4-inch, and I have had trouble with that size, but with 5 or 6 inch, straight through-

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