

the object of board and confined air. try to fit these covering the purpose; but get a space pipes to be

gratings. Such openings should be left in boxes containing plumbing work, to allow the circulation of air in all cases where they are not filled with packing of any kind and are situated in the inhabited and warm portions of the house.

The foregoing sketches (Figs. 1 and 2) will, I hope, more fully explain what I have attempted to describe:—

Where pipes run from story to story great care must be taken to secure space between the under side of the floors and the upper side of the plaster, that is, the space formed by the beams between floor and ceiling, so as to cut off any drafts. This should be carefully attended to in all buildings, and may be done either by fitting a section of well-made boxing that will extend below the plaster of the ceiling and above the floor before the plaster is put on. If it is not convenient to do this, boards may be nailed between the floor and plaster, and the space so

strips of hair felt over pipes that gave occasional trouble was all that was required. This is especially the case where pipes are frozen by draughts caused by the temporary opening of a door or window or some similar cause. Where pipes have to pass through cold cellars, it is far the best plan to bury them below frost when the nature of the ground will admit, or to do so does not interfere with their proper working. This plan is adopted in this city with great success. Where pipes so buried leave the ground in order to reach the stories above, the following method of protecting them will be found effective:— Make a box of 1-inch or 1½-inch stuff, large enough to contain the pipes to be protected, leaving a space of at least 2 inches all around them. This box must be long enough to reach from the ground below frost and up into the flat above that is warmed. Secure the pipes in the centre of this box by means of blocks, as

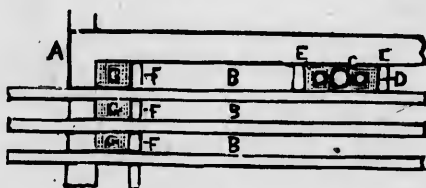


Fig. 3.

A A, walls; B B B, beams; C, enclosed space around water pipes filled with non-conductor; D, pipes; E, boards between plaster and floor to form space C; F F F, the same to form space against cold from the gallery; G G G, space similar to C, filled with non-conductor.

inclosed be filled with charcoal, cork cuttings, dry sawdust, or any other suitable non-conductor that will pack tight enough to effectually cut off drafts. Where there are galleries supported by beams that pass through the walls, cold air must be carefully prevented from coming in through the space left by the shrinkage of beams, to secure protection to the pipes and to have warm floors. At any rate no effort should be spared to prevent such cold air from coming into contact with any pipes that may be situated between floor and ceiling, or near door and window frames, especially in stone or brick houses. I know of no other method of keeping cold from coming in around door or window frames let into brick or stone than to carefully caulk the space between the wood and stone with oakum, and then to point with oil cement. I have frequently traced the cause of frozen water pipes to a defective door, window frame, or to gallery beams that were situated yards away from the pipes affected, but the cold from which had been drawn toward the pipes, the boxing in which pipes were enclosed acting as a chimney to draw the cold air in the direction where it was certain to do most harm, no effort having been made to cut it off from contact with the pipes. (For the method of protection see Fig. 3).

Pipes secured to ceilings of cold rooms or cellars must be protected on principles similar to those already laid down; the great secret of success, if I may so call it, being to have the pipes isolated in a space containing confined air. In many instances I have found that tacking

before described. Another box must be made of same length as the first one, but large enough to enclose it, leaving a space of from 6 to 18 inches, according to the nature of the situation. This space must be filled with some dry non-conductor. I have known pipes so protected to give no trouble for several winters, although exposed to an outside temperature. (See Figs. 4 and 5.)

I hope enough has been written to make the general principles to be observed in protecting pipes from frost understood, which is all that can be done in this article, the limits of which prevent my giving instructions suitable for each particular case that might arise.

My third head refers to mechanical means of preventing water from freezing, or, in other words, of keeping the water in motion. This may be done in cisterns, vats and similar vessels by means of mechanical contrivances, but it would hardly pay to do so. It is generally accomplished by letting the water run continually from some of the faucets in the house—a most effective but wrong method of procedure, as it is very wasteful, and in all well-regulated communities would subject the parties so doing to fines and penalties for infractions of the laws. Where, however, a house is supplied from a private lake, spring, or any such source, there is no objection to its employment, the only danger being that a very slow stream trickling through the waste pipes is likely to cause those useful articles to gradually fill with ice, a flooded house being apt to result therefrom.

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