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used the y cleaned iron fresh ken apart ys gathers tarred or eat cause handle is ich times lation of the pan eldom as ticles for k should

be so ventilated that a circulation of fresh air be guided to some extent by his advice, for, may be continually taking place through it. This may be accomplished by fitting 2 pipes to it, one from the top and one from the bottom of the trunk. A 1" or 34" pipe will be large enough. These pipes must be run above the roof, the one from the top of the trunk being left higher than the one from the bottom. For dwellings some of the more improved closets should be used. Where the expenses would prevent the adoption of one of these, I would prefer to fit a hopper closet, properly ventilated, as being far less liable to be the cause of foul odors than the pan closet. A ventilator from the trunk of the closet will in a measure prevent this, but the great preventive is to keep the

apparatus clean. In cold weather care should be taken, immediately after lighting the fire in the cooking ranges, to see that the water contained in the pipes attached to them is not frozen. This can easily be ascertained by feeling the pipes close to the range. If they are both of the same temperature and hot water cannot be drawn from the nearest tap, the fire should be drawn at once; otherwise steam will be generated and an explosion may occur. When the water in the pipes in connection with the range is circulating freely, one pipe will always be found hotter than the other, and immediately after kindling the fire the difference in temperature is considerable.

In case of a sudden burst in the water pipes the best thing to be done is to stop the water at the stop-cock, which should always be conveniently placed and left easy of access. The position of this stop-cock should always be ascertained on moving into a strange house. The next thing is to have it repaired in an efficient manner.

When water suddenly makes its appearance in any part of the house, try to ascertain where it comes from with some accuracy before sending for a plumber, and, when possible, send an intelligent message, that the man who is sent may have an idea of the nature of the trouble and the necessary tools and material required to remedy the defect.

It is an every-day occurrence to send out men to repair a water pipe when the trouble may be caused by a defect in the roof or cistern, the overflowing of a bath, basin or sink, or the result of carelessly spilt water, a fact which the interested one carefully keeps concealed, only to be revealed to the plumber in strict confidence after a rigid cross-examination. Try and trace the leak to its source, as water may show itself in the basement that has come from the upper stories. By a little attention to these matters your plumber's bills will be much smaller, as a great deal of time is generally wasted because the facts of the case have been improperly stated when ordering repairs. People should under-stand that it is a physical impossibility for a man and his helper to carry all that might possibly be needed to do work ; yet most persons leave orders simply to repair a water pipe. Last, but not least, I would say employ the best men to be had. Depend upon it, this is the cheapest plan in the end. Having secured a good man,

depend upon it, he knows more about the matter than you do. I write this, as I know many people give orders to workmen as to how they want a job done, and are then very apt to grumble if the results are not what they ex-pected, and say, if told it was done to their order, that the workman should not have done it if not right; but, on the other hand, they would report the man for impertinence if he refused to do as ordered.

* CHAPTER IV.

Protection of Pipes from Cold.

As the greatest enemy to plumbing work in all cold climates is frost, I have thought it advisable to devote a chapter especially to the best means of avoiding damage from this cause; and here the old adage applies with more than its usual force and significance-" An ounce of prevention is worth tons of cure."

In order to make my subject as plain and easily understood as possible, I will divide it into the for moving four parts or heads :-

Ist. T. preventive measures as regards position or situation.

2nd. Protection.

3rd. Mechanical action.

4th. Emptying the pipes.

The merits of the different methods rank in the order I have enumerated them. The position of the plumbing apparatus is most important for various reasons, some of which I have attempted to make plain in the earlier chapters of this paper, nothing being more urgent, after the sanitary aspect of the case has been disposed of, than the proper protection of the pipes from damage caused by cold. Having this object in view, all very exposed quarters of a building should be avoided as dangerous places for plumbing apparatus, and on no account should pipes be placed in immediate contact with out-side walls. Where it is impossible to avoid attaching pipes to such walls, certain precautions preventing immediate contact must be taken, they alone proving effectual safeguards against damage to pipes from cold. In many cases where the running of soil pipes on such walls is unavoidable, the water pipes, which are far more likely to give trouble, can be run in another direction, and in such positions that they will not be exposed to cold. There are in all dwellings certain apartments that should be avoided, as they are not proper situations for plumbing apparatus ; for instance, coal and meat cellars, lumber rooms, &c., because, there being no necessity for keeping such places warm, any pipes that pass through them are very apt to be a source of trouble.

After having laid our plans to the best of our ability in this northern climate, certain protective measures are still to be taken before our plumbing work is safe from damage by frost. This brings me to my second head, referring to pro-

^{*} Ohapter IV was written at special request of Mr. Bayles, Editor of The Messi Worker, after the foregoing chapters were printed, which accounts for some allguit repetitions in it; but as the subject is a most important que I concluded not to strike them ent.—J. W. H.