which would be right, because the house service needs more protection than the water main. The objection that the services would break away from the main, on account of expansion and contraction, when iron or brass pipes are used for service pipes, can be overcome by using two English slow bends, keeping them sufficiently apart to allow enough movement to take place that will overcome any expansion or sudden jars that might occur. I also consider the custom of putting a separate service pipe to each house, however small that house may be, or however many small houses are grouped together, is unwise. Water rapidly deteriorates when lying idle in pipes; not only do the friendly microbes in the water die off for want of air, but the water sets up a chemical action with the metal of the pipe. The public health demands that water pipes should, wherever possible, be worked to their fullest capacity, on that account the shortest length possible of service pipes should be used between the street main and the house taps, and as many as can conveniently be served from one pipe should be. Water mains are laid down considerably larger than is needed for domestic or trade supply, as a rule, First, because they may be called upon to furnish several streams at any moment to extinguish a fire; second, because a small cast-iron pipe, placed under a road, is easily broken by heavy traffic passing over it. So we see that it is necessary to prevent the water deteriorating or freezing in winter, to so arrange them that the water at all points is kept, if possible, constantly on the move or circulating, besides having plenty of proper provision for emptying and cleaning them out. There is a service pipe made that will resist frost: also preserve the purity of the water it contains, so far as to prevent the water from setting up any chemical action with the metal. It is made of common wrought iron pipe, having a thick, hollow core, or lining, of pure tin, forced into the interior of the iron pipe, and when forcing the tin into the inside of the iron pipe, a thin rubber cloth or other non-conducting material is placed between the two metals, which insulates the pipe, and prevents the frost having any action on the water it contains. Thus, by using that kind of pipe, the purity of the water is maintained, and the chance of freezing is nil, because it is impermeable to frost, on account of the insulator placed between the two metals, and being lined with pure tin, it is impossible for the water to set up any injurious chemical action.

To make the causes of freezing very plain, I will here relate a few of my own personal experiences. Last winter I was obliged to carry a small water pipe over a roof, and I knew the water would only move about twice each day, and there was a great difficulty presented against the pipe being boxed, so I simply insulated it by placing three-ply rubber hose over it, carefully sealed it at both ends to prevent any circulation of air between the iron and the rubber stocking, and the pipe did not freeze last winter, though the weather was severe and the pipe elevated high in the air. Frost will run down a pipe however well insulated, if the end is exposed to the air, because the frost will travel down the metal forward along the inside of the insulated covering. A customer of mine being troubled with mice, that ran along the pipe line of the water pipe placed under the floor boarding, crossing the joints, from the kitchen boiler to his bathroom, took up a board and encircled the lead pipe with a small piece of tin to stop the mice from passing over the joists alongside of the pipes. The house every year was kept so well heated that the pipe had never been known to freeze, but the small piece of tin made it freeze, at the point where the tin touched the lead pipe, because the tin attracted the little frost that was in the air between the floor and the ceiling, and drew it or focused it on to that part of the pipe that the tin touched, and just there I found the stoppage. Some twelve years since, the Grand Trunk Ry. offices, Montreal, were thrown in the dark by a stoppage of their gas supply. I found the defect was caused by the gas being frozen in the ¾" supply main place in the false roof, where the atmosphere never was less than 50 degrees of heat, therefore nowhere near the freezing-point, but a nail had fallen out of a shingle in the roof, and the heat of the false roof being near the seventies, and the outside being about 30 degrees below zero, there was a rapid ingress of cutting cold air through the small nail hole in the roof, into the false roof, which made a bee line to one of the ventilators placed in the ceiling to ventilate the office below, and on its passage forward it struck the gas pipe about the one-eighth of an inch in width, and crystalized the damp gas at that point, cutting off the supply.

There are many waterworks' fittings that have been carelessly constructed, and to rectify the injury done would cost a great deal, therefore if anyone can come forward and show how such badly-laid pipes can be prevented from freezing and bursting, or show us an easy way of thawing them out when they are frozen, they will be public benefactors and deserve commendation. Town councils and private individuals have had to part freely with their money, and suffer much inconvenience on account of shoddy work that could not be prevented freezing in past years. Electricity, which has a close similarity in its actions and methods of travel with frost, is proved by Professors Wood and Jackson to be able to thaw frozen pipes, small or large,

Hundreds of frozen pipes were thawed out last year by the electrical method, both quickly and at a far less cost than when the dirty steam kettle is used, and I cannot do better than repeat the report Mr. Hiem publishes of Messrs. Wood and Jackson's successful work in the thawing out by live electric currents. The attention of Mr. Wood was drawn to a service pipe that could not be thawed out by a steam boiler, nor could the kink in the pipe that was frozen be reached any other way until warmer weather should set in, so Professor Wood consulted with Professor Jackson, and both together they tried to thaw out the obstinate pipe by electricity, and succeeded beyond their expectation, and then they introduced the system generally. Mr. Hiem goes on to say:

"I will now give you the computations Professor Jackson was kind enough to give me, and which have been verified in the different cities where the conditions were proper and the thawing successful. To thaw out lead or iron services up to one and one-half inch, you should use from 200 to 250 amperes; if you are not able to get more than 125 amperes, it will take four times as long. If you use over 250 amperes you are liable to get into trouble by overheating the corporation stop-cock, and all other brass connections. Wrought-