must be continued at short intervals until the crossing is passed.

(*r*) An officer shall be stationed at every level crossing of two railways, and no train shall pass over it until a signal has been made to the conductor that the way is clear.

(*s*) Every train shall stop one minute at a level railway crossing as in No. 16, unless there is an interlocking system, when they may pass at such speed as the committee may allow.

(*t*) No train shall pass through thickly populated towns, etc., at more than six miles per hour, unless the track is fenced.

(*u*) No train or car shall be allowed to stand on a highway crossing more than five minutes at a time.

(*v*) All frogs, wing rails, guard rails, etc., shall be packed up to the underside of the rail wherever less than five inches space exists.

(*w*) Sections (*p*), (*r*) and (*s*) have been recently modified so as to permit of interlocking signals being introduced at junctions and railway crossings, in which case the Privy Council may permit trains to pass in or across at specified rates of speed without stopping, whenever the signals give the right to do so, but if the signals are not satisfactorily worked the council may revoke the permission.

For THE CANADIAN ENGINEER.

THE VENTILATION OF PLUMBING APPLIANCES.

BY W. M. WATSON.

In a former article I showed some of the evils attached to the present method of ventilating traps at the highest points, and the danger of venting plumbing in any case. I have never been able to find out the reason why such a complicated and expensive system was invented, but have an impression that the inventor erroneously thought that there would always be an upward current from the breather pipe at the ground line to the terminating end of the soil pipe above the roof, and there certainly would be if the temperature of the atmosphere at both points were always equal, or if it were always colder above the roof than it is at the mouth of the breather near the ground line. But sometimes it is warmer, and in that case there will be a down in place of an up draught. If the purification of the interior of the house soil pipes was aimed at, then the object is often frustrated by the choking of the street line sewer trap, or by the breather getting filled with stones, dirt, or weeds, and even when every point of the house drainage is free, open, and working well, we find that by adopting the Chicago and Toronto rules we are sacrificing the greatest sanitary privilege adopted, viz., the ventilating of the street sewers above the house tops, for the insignificant purpose of securing a very small and doubtful advantage.

When the soil pipe is connected without the street line trap, direct to the crown of the main sewer, as shown in THE CANADIAN ENGINEER of April, 1897, there is nearly always an upward current from the drain to the head of the S.P., because the temperature in the main sewer will generally be higher than the atmosphere, and if any exception to the rule occurred, causing a down draught, the foul odor in the house soil pipes would be forced into sewer, instead of out of the breather, which is the case at present. Since the American system of plumbing was adopted in Toronto I have noticed some of the places where fever and diphtheria have occurred, and I believe that statistics will bear me out when I say that the street line trap and vent-pipe method of plumbing is doing considerable damage. It is hard to choose between the evils of the careless putty and paint plumbing of twenty years ago and the intricate plumbing demanded at the present time in Toronto.

When Dr. Norman Allen was the medical officer of Toronto I asked him if he considered it right to spoil the ventilation of the public sewers and injure private property by compelling each owner to put in a trap at the street line of the private drain? His answer was, "No," but he reminded me that the by-law was passed by the council, and again altered within a few months, and that if another change was made so soon it would put both his department and the council at a disadvantage, because the public would get alarmed and lose confidence. The fact that the present officers who apply the law in Toronto are in no hurry to give their own private property the benefit of the Toronto plumbing by-law, proves that we might place them also as unbelievers in the system.

It is necessary to keep polluted air moving, and the vent pipes will help to do this; but to get air to circulate naturally, it must have a continuous circuit, and if branches are inserted into the line, the draughts will be spoiled, exactly as with the draught of a stove, when the smoke pipe is inserted into a chimney flue where there is another stovepipe hole open. Taking this fact into consideration, it shows that as every house must have at least three vent pipes, and two of them are branched into. one, or all three are branched into a receiver, which in turn is branched into the side of the soil pipe, it makes it impossible to secure a natural draught through any of the pipes, because no continuous circuit can be formed, and the conclusion must be that the only real value the vent pipes can be, is, that they do away with any pockets where air may lodge in the waste pipes, and will prevent any chance of syphoning of the traps.

There is evidently a strong feeling in certain quarters in favor of creating unnecessary business, increasing expenses, and securing a monopoly in favor of syndicates and wealthy tradesmen, to the exclusion of the small ones. When reading the by-laws of Toronto one cannot but see that the sanitary advantages are put in the shade by the points that call for high licenses, heavy bondsmen, useless piping, labor and joints. Great waste is obvious in many places. In one case we find a sink only intended to catch water from a garden tap placed in the cellar that has about 40 ft. of 1½ in. iron vent pipe running level under the ceiling joists until it is attached to the w.c. vent. Now the friction that will have to be overcome before any movement of air can take place in a 40 ft. length of so small a pipe laid horizontally, is more than enough to totally prevent any action, and of course such a pipe is perfectly useless. In some small cottages rented for about $4 per month, having a w.c. and soil pipe through the roof, and on the opposite side of the house a sink with about two feet of 1½ waste pipe and trap attached to a properly ventilated drain, as also a vent pipe taken from the knee of the trap and continued up to above the roof, with 3 in. iron soil-pipe, costing about $14 each house, which expenditure is of no value for sanitation purposes, and it injures the current of air in the drain, and assists to dry out the sink trap.

There are a number of large towns, with a dense population closely packed together, in Europe, whose sanitary rules are of such a nature, and so well applied, that with all the disadvantages of the majority of the people working in close, heated rooms, having the fumes from grease, soap, steam, etc., to inhale, the death rate is less