



EXPLOSION OF A DOMESTIC HOT WATER BOILER.

EXPLSIONS of domestic hot water boilers attached to cooking ranges, water-backs in ranges, etc., through freezing of the pipes in cold weather, are becoming so frequent that it may not be out of place to give an account of one of the most destructive ones that has occurred recently, and point out its cause.

The boiler in question was used in a hotel in a large city in one of the northwestern States, where the temperature is very low at times. It was connected to the kitchen range; the range was a large one, and the heating surface was furnished by a coil of $1\frac{1}{2}$ inch pipe placed near the top, instead of the cast-iron front or back such as is commonly used in the smaller ranges in private dwellings. The connections to the boiler were made in the usual manner; the accompanying cut shows its essential features.

The operation of all boilers of this sort is as follows: The connections being made as shown in cut, the water is turned on from the main supply and the entire system is filled with water. When it is filled and all outlets are closed, it is evident that no more water can run in, although the boiler is in free connection with and is subjected to the full pressure of the source of supply. When a fire is started in the range, and the water in the circulating pipes of water-back is heated, the water expands, is consequently lighter, and flows out through the pipe into the boiler at A, as this connection is placed higher up than the one at B; this starts the circulation, and the water as it becomes heated constantly flows into the boiler at A, and rises to the upper part of the boiler, while the cooler water at the bottom of the boiler flows out into the circulating pipes at B, and if no water is drawn a slow circulation goes on, as heat is radiated from the boiler, in the direction indicated by the arrows, the water at the top of the boiler always being much hotter than at the bottom. When the hot water cock is opened, cold water instantly begins to flow into the boiler at D, by reason of the pressure on the city main, and forces hot water out of the boiler at C. Thus it will be seen that hot water cannot be drawn unless the cold water inlet is free, and it is equally evident that cold water cannot enter the boiler unless the hot water cock or some other outlet is open.

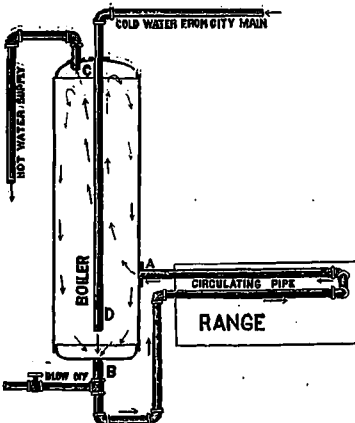
The above points being understood, we are in a position to investigate the cause of the explosion referred to, which killed one person and badly injured twelve or thirteen others, besides badly damaging the building.

On the morning of the explosion fire was started as usual in the range about 4 o'clock a.m. It was found on trying to draw water that none could be had from either cold or hot water pipes; it was rightly judged that the pipes were frozen. The fire was continued in the range, however, and the breakfast prepared as best it could be, and a plumber sent for to thaw out the pipes. He arrived on the premises about 7 o'clock, as would naturally be the case. He opened both hot and cold water cocks, and getting neither steam nor water, concluded there was no danger, and proceeded to thaw out some pipes in the laundry department first. About an hour afterward the explosion occurred. The lower head of the boiler let go, and the main portion of the boiler shot upward like a rocket through the four stories of the hotel and out through the roof.

The corner held an inquest on the remains of the person killed, and some of the testimony given, as reported in a local paper, would be amusing were it not for the tragic nature of the affair which called it out. The usual expert, with the usual vast and unlimited years of experience, was there, and swore positively to statements which a ten year-old boy who had been a week in the business ought to be ashamed to make. He had examined the wreck with a view to solving the mystery? The matter was as much of a mystery now as it was on the day of the explosion? His theories were exploded as fast as he presented them. The boiler must have been empty. If it had been full of water it could not possibly have exploded, etc., etc. And then a lot more nonsense about the "peculiar" construction of the boiler. As a matter of fact there was nothing peculiar about the boiler or its connections. Everything was precisely like all boilers of this class, of which there are probably hundreds of boilers in daily operation throughout the country, and moreover they were all right.

Now let us inquire what caused the explosion. Every-

thing was all right at 8 o'clock the previous evening, for water was drawn at that time. The fire was built in the range at 4 o'clock a.m. It is admitted that the cold water supply pipes were frozen, for no water could be had for kitchen use. It is also proved absolutely that the hot water supply was frozen or otherwise stopped up, by the fact that at 7 o'clock the plumber who came to thaw out the pipes opened the hot water cock and got "scalding water for steam." Here was his opportunity to prevent any trouble, but he let it pass. Any one who understood his business would have known that there must have been a tremendous pressure in the boiler at this time, as the range had been fired steadily for three hours; there was about eight square feet of heating surface exposed to the fire by the circulating pipe in the range, and there had been no outlet for the great pressure which must have been generated during this three hours' firing. The blow-off cock should have been tried at once; if this were clear, and the probability is, from its proximity to the range, that it was clear, the pressure could have been relieved and the disaster averted. If the blow-off proved to be stopped up, then the fire should have been at once taken out of the range. At the time the plumber opened the cocks connecting with the boiler, it probably was under a pressure of four or five hundred pounds per square inch. An ordinary cast-iron water-back such as is used in small ranges in private houses, would have exploded shortly after the fire was built, but it will be noticed that the heating surface in this case was furnished by a coil of $1\frac{1}{2}$ inch pipe; this was very strong, and the boiler was the first thing to give way, simply because it was the weakest part of the system.



Accidents of this sort can be easily avoided by exercising a little intelligence and care. The hot water cock should always be opened the first thing on entering the kitchen every cold morning. If the water flows freely, fire may then be started in the range without danger. If it does not flow freely, don't build a fire until it does.—*The Locomotive.*

SANITARY CONDITION OF TORONTO.

THE Toronto City Commissioner had inserted in the daily papers recently a statement that all the streets and lanes in the city had been cleaned, and that he would be much obliged to any citizen who would inform him of streets remaining uncleared. We were struck on reading the notice with the thoughtfulness of the Commissioner, and his evident desire to honestly fulfil his duties. Accepting his invitation, we began peering into lanes when opportunity offered in our daily walks. We expected to find them as perfectly clean as possible, but in this we were greatly disappointed. Many, it is true, had been cleaned, but what a number had not been touched! It was also noticed, whenever investigation was carried far enough, that many lanes leading out of other lanes were filthy from end to end, and that nearly all the cleaning had been done in those opening into important streets.

If it is unavoidable that the citizens must put up with dirty lanes throughout the winter months, they should certainly have the benefit of clean ones during the summer. Dirt should be removed for the sake of cleanliness, but much more because it is the cause of disease. There is too much apathy on the part of the people on all sanitary questions. If it is only some one else who is ill, we do not concern ourselves, but when we are ill, we look at things very differently. In the one case, we call for economy and condemn extravagance; in the other

we affirm that economy is criminal when the exercise of it results in injury to ourselves.

The authorities of this city are so economical that they cannot afford to erect a garbage crematory; but deposit in all the low lying places in the city filth which should be completely destroyed by fire. What the result of this mode of proceeding may be cannot be definitely stated; but of one thing we can be assured—that many of the future inhabitants of this city will be ill when they need not have been, and many will be laid in their last resting place before their time, because of the false notions of economy entertained by our governing bodies.

VENTILATION AND DISEASE.

The following recommendations formed the substance of a report on the subject of ventilation presented by a Committee of the Provincial Board of Health of Ontario, at the meeting held in this city a fortnight ago:—1st, that the sputa of consumptive patients, wherever it is possible to have it so, be received into suitable vessels containing a disinfectant and as soon as possible disposed of by fire; 2nd, that the freest possible ventilation of rooms occupied by consumptive patients be always and in every case secured, and in order to accomplish this result that (a) a minimum space of 1,000 cubic feet should be allowed to each occupant of a bedroom, (b) superfluous curtains, carpets, furniture, etc., should be forbidden, (c) wall paper on bedrooms should also be forbidden; 3rd, that as consumption is the principal cause of death in this province, and the germs of the disease must therefore be widespread, thorough ventilation of public buildings, especially school rooms and dwellings; is strongly recommended; 4th, that sanitation and health resorts in which consumptive patients are brought into close proximity with patients affected with other diseases, more particularly diseases of the air passages, are to be avoided; 5th, that in hospitals tuberculous patients ought to be separated from those affected with other diseases; 6th, that in a private family occupancy of the same bed or even of the same room with a consumptive patient, if consistent with the duties of humanity, be forbidden.

The town of Strathroy will shortly be lighted by electricity.

J. Harris, plumber, Halifax, N. S., is reported as having assigned.

The streets of St. Thomas will be lighted by electricity for the next three years at a cost of 28 cents per light.

It is recommended that the water supplied to the citizens of Ottawa should be purified by aeration, precipitation and filtration.

The Standard Electric Light Company of Canada, Cookshire, Que., has been incorporated with \$25,000 capital stock, for the purpose of manufacturing electric apparatus.

Plumbers are reminded by the *Sanitary News*, that a fortress is no stronger than at its weakest point, therefore, the best job of plumbing with a little leak is hardly better than a botch.

The Medical Health Officer, City Engineer and representatives of the City Council of London, Ont., have had a conference with the Provincial Board of Health regarding the best method of disposing of sewage.

The water supply of St. Johns, Que., has been declared impure and unwholesome. The water from the Richelieu is good if taken at the proper point and led to the town in such a manner that contamination would be impossible.

In view of the possible danger from Asiatic cholera during the approaching summer, it is gratifying to observe the promptitude of the Dominion Government in deciding to make needed improvements at Grosse Isle, for the purpose of perfecting as far as possible our quarantine system, in accordance with the suggestion of the Provincial Boards of Health.

The Master Plumbers' Association of Philadelphia, recommends as a proper test of house drainage, a pressure equal to three pounds to the square inch applied to the soil-pipes or drainage-system in new houses, or to entire new work in old houses before the fixtures are attached or placed in position, and for work with the fixtures attached a pressure equal to "water gauge."

The recommendation of the Medical Health Officer that vendors of milk be required to obtain permits, and submit to having their premises regularly inspected has been adopted by the Toronto Local Board of Health. The necessity for a more careful oversight of milk vendors and their premises formed the subject of comment in these columns recently, and we are pleased to