For a long way the waters do not mingle, but flow side by side. The Ottawa River has also another course around the Island of Montreal. During a continued cold spell so much frazil is made in the open water of the St. Lawrence, just before it enters the lake under the surface ice, that the channels become almost completely blocked. The water is consequently forced around the head of the island into the Ottawa River channel. This in turn forces the Ottawa entirely into the back river course. The Montreal waterworks obtain water on the north side of the river above Lachine rapids, and under normal conditions receive almost entirely Ottawa River water. When the Ottawa is forced out of its channel and its place taken by the St. Lawrence, the fact is made apparent by the difference in color of the tap-water in the city.

In conclusion, a great deal might be said about frazil, with reference to the construction of hydraulic works, but as the present paper is simply an explanation of the appearance of river ice in its many forms, from the point of view of a physicist, the rest will be left to those more competent to deal with that side of the question.

As in northern countries it will be impossible to prevent the formation of frazil ice, it becomes the duty of the engineer to make a careful study of the facts attendant on its manufacture and agglomeration, and to apply such knowledge intelligently. As we continue to grasp more and more the true scientific nature of river-ice formation, we may hope, not without reason, to find possible methods for tempering its effects. The practical advantages to the industries of the country derived from such a result would be incalculable.

For THE CANADIAN ENGINEER.

ANYONE CAN ASSAY.*

BY ALEX. ROY, TORONTO.

[The following easy method of making a test for gold is the cheapest and most convenient of which we know. The instructions must be followed with precision, and to attain good results, a certain dexterity in handling the materials is necessary; but this may be attained by practice.—ED.]

MATERIALS.

The actual requirements for finding out if an ore carries gold, are:—

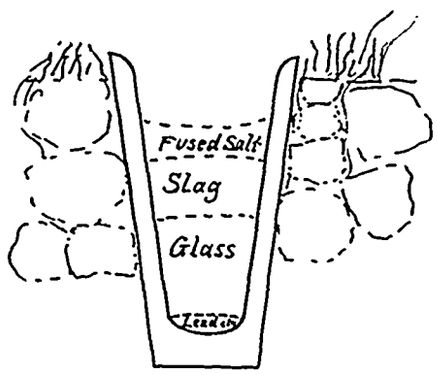
A good hammer.
A few crucibles.
A few cupels.
5 cents worth of litharge.
5 " " washing soda.
5 " " cream of tartar.
5 " " nitric acid.
A small quantity of salt.

This amount will make half-a-dozen assays, and the materials can all be carried in a small grip. Cupels are made of bone ash powdered up as fine as flour. This can be bought for about twenty cents a pound, and one pound will make about forty, and can be carried in a small pepper-box, packed inside with paper to prevent their being broken. Litharge can be got at any village drug store. Cream of tartar or washing soda can both be found in any farmhouse, as also salt.

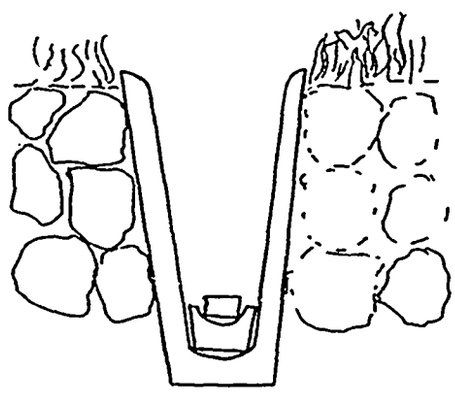
The usual method of prospecting is to arrange board for a week at a farm house, except in uninhabited districts where camping is necessary, and prospect around a day's walk in different directions, then go on to the next place. Gold can be looked for to advantage in the neighborhood of any reported discoveries. The writer has made assays of gold ore from almost every county in Ontario north and east of Lake Simcoe and Peterborough, all of which showed more or less gold.

PROCESS.

Pound up the ore to powder and mix it up well, then shake it so as to make any heavy gold fall to the bottom, then take one tablespoonful (= one ounce), or for accurate work 1 ounce, and lay it on a piece of paper, then take a tablespoonful of washing soda (= one ounce) and mix it with the ore, then a teaspoonful of cream of tartar (½ or ¾ ounce) and mix it in with the other two, and add a tablespoonful of litharge (two ounces) and mix it with the rest. Then pour the whole



of it into the crucible, cover it with salt ½ inch in depth, and place the crucible in a good fire so that it can get white hot. Let the contents melt into a liquid and then take the crucible out and gently tap it on something to shake the lead, etc., down to the bottom. Then let it cool and break the crucible. At the bottom will be found a piece of lead about the size of a coat button and of the same shape. Take this out and pound it up into a cube or little square block, so as to get all the sand and other stuff out of it. Then take a clean crucible and place it in the hole in the fire that the other one was taken out of. Place the cube of lead in a cupel, and lower it into the crucible with a thin strip of paper. Let it get quite hot or until it begins to fume or give off a little white smoke, and let it keep doing this for about an hour. It will gradually all grow smaller, until there is only a very small bead of it left which won't pass off. Take a small piece of silver (a shaving off a five-cent piece will do), and drop this on this bead and let them melt together; take out the crucible, and let it get cold. Then take out the bead very carefully and lay it on a piece of flat iron, and press a hammer down on it till it



is flat. Place it in a small vial, or bottle, or a tea cup, and pour a little nitric acid on it and heat it a very little. If there is only silver present it will all melt up in the acid, but if there is gold, there will remain a small black flake, which will reveal its true character by rubbing it with a knife.

This is all that a prospector requires to know, as if