known to hold to the depth of 80 feet, with water surging by and through it. It does not form in solid cakes like surface ice, as many unacquainted with ice formation might suppose, but remains as it is formed—a sort of "slush," like half-melted snow.

Why, we ask, is it formed in this way, and how is it held against the enormous force of a rolling tide, like the St. Lawrence rapids, for instance; and why, again, does the whole mass loosen its hold upon the bottom of the river, and rise and float away (as it does before a mild spell is about to set in), while the thermometer may be still at zero? Whatever the cause, such is the action of frazile ice, and whenever masses of it rise and float down, no barometer is a surer indication of an ensuing spell of soft weather.

It may be that a kind of magnetization takes possession of these fine ice needles, and that the mass of the anchor ice is demagnetized by the change of the weather. We note that the beautiful auroral displays of Canadian winter nights are a sort of electrical storm, and are accompanied by changes in the weather, and it would be interesting to know if any one has noticed the coincidence of this and the loosening of "frazile ice." If any of our readers have observed this or other phenomena, we should be glad to have a record of their observation.

For THE CANADIAN ENGINEER.

HOW FINE SHOULD CEMENT BE GROUND?

BY CECIL B. SMITH, MA. E., A. M. CAN. SOC. C. E.

There is probably no test to which we submit Portland cements, in which the lines are being drawn tighter than that of fineness.

Not many years ago 10 per cent. residue on a No. 59 sieve was satisfactory, then 5 per cent. on the same sieve was demanded, until now-a-days our societies are demanding a cement which will laugh at a No. 50 sieve, and escape with only 10 per cent. vanquished by a No. 100 sieve. Of course, those who study the nature of cements know that the finer the better, other things being equal, and the demand for fineness is largely justified. But let us, on the one hand, consider when this demand should be made, and when not, and where we are going to stop, and, on the other hand, let us appreciate fineness at its full value where needed, and give our Canadian Portlands full justice and appreciation.

Cements are used in such numerous ways for such various purposes, that hard and fast rules can hardly be laid down; instead, let us rather try to have all engineers so posted on the subject as to enable them to use proper judgment in selecting various grades for different purposes. For instance: If we wish to fill water pipe joints with cement mortar, we have Mr. Coffin's experiments to show that a 1 to 1 mixture will allow less percolation by water under pressure than either a richer or leaner mixture, and, certainly, a very ordinary coarse English or Belgian Portland will be amply strong for the purpose. Again, German and English experiments show that the maximum efficiency for abrasion in sidewalks, etc., is that of a 1 to 1 mixture, and a very coarsely ground Portland will do for this; while, where strength pure and simple is needed, as in concrete and heavy masonry, the economy of fine grinding can be fully realized.

As to where we are going to stop in our demands it is hard to say, but it is almost certain that until a larger percentage of our engineers and architects actually demand certain fineness, see that their demand is carried out and satisfied, and make such demand intelligently, *i. e.*, with a knowledge that fineness must be paid for because it costs money to grind fine, and are willing to pay for it, instead of buying a coarser article, because it can be had 15 or 20 cents per barrel cheaper; until this time comes—and it is not here yet—we shall not give the encouragement that we ought to those manufacturers who give us a finely ground cement. Germany is in the van in fine grinding, but our Canadian makers are a good second, and let us realize it. It is hard work to make many people believe that we are really able to get A1 Canadian Portlands, but let them investigate it themselves and find out the advance that one or two years has made. It is invidious to institute comparisons, but we have several brands that are becoming uniformly good, and they need all the encouragement we can give them; they make a small portion of what is used in the country. Let us hope that the fullest knowledge will convince engineers that we have in our midst makers of this key to engineering works that are able to give us fine sound cements; let us encourage them to make all we need in the near future.

"HE TIED THE SAFETY VALVE DOWN."

The above is a photo-engraving of the mill of Geo Fensom which was blown up at Elmwood, Ont., in June, as reported in THE CANADIAN ENGINEER. Mr. Fensom has a sense of humor, and takes his loss more philosophically than most manufacturers would, as may be gathered from the following letter written to the Babcock & Wilcox Co.:—

SIR,—Your letter, also your book, "Steam," came duly to hand a few days ago. I am very much pleased with the book, as there is a great deal of very valuable information in it.

I had my mill let to a man that ran it with the safety valve tied down—result, the mill was blown down, and costing me $3,000 to rebuild. I send you by this mail a photo of the mill, taken a few days after the explosion. There was not a brick left on foundation of engine house You can see the shell of boiler lying on a pile of brick, looking like some old hide, with flues scattered all around 100 yards away If it is not too much trouble, would you please send me price of a boiler, also amount of room required to place it in I will make good use of the book you sent, and will try and let others have benefit also With best thanks, I remain, yours truly,

GEORGE FENSOM.

Upon which Mr. Bonner, agent of the Babcock & Wilcox Co. makes the following comments. "This letter is an illustration of the good natured way in which some people accept misfortune, and at the same time gives us some idea how men feel after they have been 'through the mill.' They are looking for improvements. Even if the safety valve is tied down, there is no necessity for such wholesale destruction of life and property. Absolutely safe boilers are to be had, and certainly no better evidence is needed that only the best is the cheapest WM. BONNER."