

Evidence of Mr. John Galbraith. ERECT PIERS AND BOOMS ABOVE LACHINE RAPIDS.

Mr. John Galbraith said most of those who had already given their evidence before the Committee, or through the press, had justly attributed the flood to a great extent to the formation of anchor ice, which is produced in great abundance in the rapids and open water above, choking up the more shallow parts of the river while the river is still low, and driving the main body of the water into the deeper channel, causing a shifting of the surface ice that has, by this time, formed by the same severe cold that produced the anchor ice, and thus producing a new and greater difficulty, such as has existed all the past Winter below our city.

Mr. Hodges, Contractor's Engineer for the building of the Victoria Bridge, published a book in 1861, being a description of his great work, and takes occasion to make the same remarks regarding the Montreal floods, and no man had a more lively appreciation of the difficulty, its course and extent. Such then being the cause of our floods they ought to prevent the production of anchor ice.

He said there was a great deal of misapprehension concerning anchor ice, and how it is formed. He had seen a letter in the *Gazette* throwing ridicule upon the statement that there could be anchor ice.

In answer to a question about the widening and deepening of the channel below the city, as a preventive, Mr. Galbraith expressed the belief that every effort in that direction would be of service; but the difficulty of getting a sufficient fall of water below the city would render those efforts comparatively valueless.

The person who wrote that article in the *Gazette* could not have been long a resident of this country, or he would have known better.

Anchor ice formed mostly in the Lachine rapids and in the waters above them, where the water was open, and appeared more like cart-loads of sludge than solid ice. He had seen large cakes of ice rise from the bottom of the water. It only formed when the temperature was about 10 or 15 degrees below zero, and where there was a rocky bottom; it would not form on wood or mud.

Anchor ice and frazil were entirely different; anchor ice formed at the bottom, and frazil in the body of the water; frazil is anchor ice, or rather ice in its inception form, but having failed to attach itself to a conductor by the rapidity of the water motion; snow falling into the water and being congealed under different conditions, then ice will sink in the water and add to the frazil floating there, and help to produce the obstruction complained of. He attributed the formation of anchor ice to the water on the top becoming cold and falling to the bottom, where, if it met with some good conductor, which would carry off its latent heat, it froze solid and only reappeared at the return of mild weather, when it was liberated and came to the surface. The reason why there was so much anchor ice in the St. Lawrence, he believed to be on account of the vast extent of open water in and for ten miles above the Lachine rapids, affording sufficient time to effect a process of equalization of temperature down to the freezing point before reach-

ing the cover below the rapids and thus becoming fastened to the rocky bottom, being helped much by the agitation of the rapids in becoming still more firmly rooted thereby. If they could devise some means to provide a covering for the water and so prevent the heat from radiating, the anchor ice would not form. This, he thought, might be done by building an arc of piers, with booms thrown across in Winter to facilitate the process of taking. The water would at once begin to freeze in Winter at the sides and gradually extend back until the whole of the open water would be frozen over. The dam at Carillon had had this effect. The pier, he thought, should be built across the river about a mile above the first break of the Lachine rapids, care being taken to have them sufficiently close together to effect the closing of that part of the river, the piers thus forming the necessary shoulder to the ice-cover. For purposes of navigation, the centre space in mid-channel could be made wide enough for steamers to get through with safety. The barrier thus formed would keep the upper ice sufficiently long in the Spring of the year to give time for the ice in front of the city to undergo considerable liquefaction and less capable of resisting the upper ice when it should come down; and in this way would save us from the Spring flood also. Lachine would suffer no inconvenience by it, but on the contrary would be greatly benefited by the ice bridge so formed.

Mr. Galbraith said also that the water issuing from under this proposed cover, would retain a large portion of its natural heat and would reach the cover below the rapids without having parted with it to that degree necessary to produce anchor ice, except in extremely cold weather, say 35 degrees below zero.

Mr. Baker said he agreed with Mr. Galbraith that where there is a covering to prevent radiation, nothing will freeze underneath. Thus, anchor ice would not form under surface ice. The St. Lawrence was one of the greatest factories of anchor ice in the world, owing to the open water at the Lachine rapids and Lake St. Louis.

Mr. Galbraith continued to say, that if the water below and above our city were less rapid and turbulent, so that a higher degree of temperature would suffice in effecting its close, the difficulty would not be so great. The most difficult thing was to start the formation of the ice for the covering, and this was the benefit of the boom. It would also serve to retain the upper ice until that below the city had a chance to break up.

JOHN GALBRAITH.

Evidence of Mr. Joel C. Baker.

THE PRINCIPAL OBSTRUCTION AT BOUCHERVILLE.

Mr. J. C. Baker said that when a young man he was in the habit of going at Christmas and Easter by way of the river to his home in the county of Missisquoi, and, therefore, had frequent opportunities of watching the state of the river at these times, and the changes it underwent. What caused the dam was the frozen ice and frazil that came down and caused an obstruction, and made a very perfect dam. These obstructions do not occur generally in deep

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