



### THE FAILURE OF THE CHAMBLY DAM.

The fact of the failure of the dam of the electrical power works at Chambly, Que., on the 30th November, was reported in our news columns. We now give two views, showing the displacement of the larger section of the dam. The section broken was that part which ran across the river at right angles to the bank and was about 350 feet long, extending from the bulk-head to that part of the dam which runs up and down the river.

The detached piece of the dam, shown in the engraving, was carried 80 feet away from its proper position, and some large pieces were swept down the river. The head-race of Willett's woolen mill, shown dimly on the left of the long picture, was washed out and the flumes strained. An east wind blowing up the Richelieu river at this point frequently raises the water a foot or more above the normal level, and at the time of the accident, such a wind was blowing, thus adding an unusual volume of water to the overflow. Men were working at the time on the section running up and down stream, which was being reinforced with concrete, these repairs having been rendered necessary by the previous failure of a year ago, when the dam was undermined by water rushing through the waste ways. The recent failure appears to have been a further undermining, the concrete having been laid on red shale and without sufficient hold upon the river bed.

The contractors appear to have followed the specifications as to the kind of cement to be used and as to the method of laying it down. The moral of the failure is simply this—that to have a safe dam one must have a sound foundation, and money saved in laying a foundation may be more than lost in the breaking of a dam and injury to the structures and machinery connected with it.

### BIG TIMBER FLUME IN CALIFORNIA.

A remarkable engineering feat has been accomplished in the building of the great flume at Madera, Cal., 185 miles from San Francisco, in the heart of the redwood forests. This flume is the longest in the world. It is  $53\frac{3}{8}$  miles long, or, including feeders, 71 miles. The flume is V shaped with 36-inch sides and is 46 inches across the top. It is built of double two inch plank. It has a carrying capacity of 400,000 feet of lumber daily. In building it 5,700,000 feet of lumber were used and 21,000 kegs of nails. The water for operating is taken from the mountain streams which supply the Madera canal, and after it has served its purpose of transporting lumber it is turned into the canal at its lower end and used for irrigation. The timber is carried through it at the rate of  $3\frac{1}{2}$  miles per hour. All that is required is a man at the top and bottom. If timber is coming in from the branches a man is stationed at the junction to prevent jamming. The building of the flume was a gigantic task. Mountains had to be overcome, great gorges bridged, deep forests penetrated and steep hill-sides and precipitous cliffs blasted to make secure foundations for the heavy scaffolding which supports it. The total cost was \$270,000.