The piers are spaced 21 feet centre to centre at the stop-log guides and are on radial lines. From nicely rounded noses they increase to a maximum of 5 feet in thickness at the stop-log guides and taper to 38¼ inches at the downstream end, leaving a minimum sluiceway of 16 feet in width.

The piers are covered with a reinforced concrete deck 25 feet in width, the upper surface of which is 25 feet

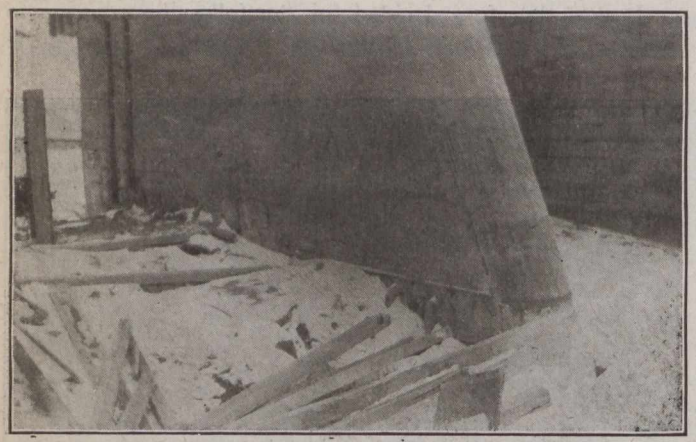

Fig. 9.—After the Forms Had Been Removed

above the sill. This large surface is necessary to take care of 20 British Columbia fir stop-logs 12-in. x 12-in. for each sluiceway. They are bolted together in pairs and raised and lowered by means of an electrically driven travelling stop-log hoist. Two sets of stop-log guides set 2 feet 6 inches apart, were provided to meet the requirements of the Hydro-Electric Commission.

The method of constructing the dam followed closely the facilities offered by natural conditions. The east channel, which discharged a less amount of water than the west, was first cut off by means of an L-shaped cofferdam, terminating on the east edge of the west gorge, thereby throwing all water clear of the island and permitting not only the construction of seven piers on the island, but rock work on the power house, which had to be completed before the headworks and first piers of the dam were built. No difficulty was experienced with the upper cofferdam, as the bottom was smooth and hard and the water shallow, the result being that the cribs were well lined up and the sheeting well fitted to the bottom. The crib at the corner of the L was sheeted on three sides so that when the west channel was to be cofferdammed it would act for it also. Timbers in the corner were left projecting a short distance so that in placing they lapped over the adjoining crib, thus being held solidly in position.

Before the spring freshet of 1917 the eastern gap was entirely closed, the headworks of power house and dam being well above high-water. The first cofferdam was removed (Fig. 7), the filling being used by the company to load their retaining piers for the spring drive.

After the spring freshet the west channel was closed, the water turned through the completed sluiceways (Fig. 8) and the balance of dam completed.

Waterproof expansion joints of the lead and asphalt type were placed every third pier. The greatest portion of the concrete was poured hot in a temperature many degrees below zero, with little protection save for forms. Before pouring started on the previous day's work, the frozen surface and laitance was thawed out with steam and removed. The removal of forms during the summer months revealed most excellent results, as will be seen by Fig. 9, the concrete being extremely hard, free of blisters or bad joints.

During the time the dam was under construction, work was being rushed on the power house and tail race, the latter being held up to some extent until the lower cofferdam was made tight. The river-bed below the falls for a distance of 300 feet is only about 180 feet wide, but slopes rapidly to the centre, where it is 50 feet deep. The bottom was very irregular but was made worse by blasting operations on shore, some rock from each shot spilling into the river.

In this place cutting off half the cross-sectional area of the river, the tail race coffer-dam (shown in Fig. 10) was constructed in the following manner: A point below the tail race was chosen as a starting place and a raft constructed, in plan the size of the largest crib required. This was secured in position by guy lines and soundings taken with steel rods over every foot where the bottom timbers were to rest. Short pieces of round timber were then cut and placed together on shore, conforming with the bottom. This was then slid into the water and other timbers drift-bolted on them in the regular manner, until such time as it was considered advisable to place ballast floor. This is one of the fine points in coffer-dam work and depends on depth of water, strength of current, size of crib and material used. One-man stone was then wheeled in barrows and dumped into the crib until it rested on the bottom or required more timber, the crib all the time being held in the same position as the raft. In this manner crib after crib was built, sunk and permanently loaded, being so placed that it rapidly curved upstream into water 46 feet in depth and resting in places on a rough bottom inclined at an angle of 30 degs. Unfortunately, at the point where the water was deepest the maximum current was encountered, the deep fissure in the west channel directing a heavy under-tow directly against the cribs, requiring several large cables to retain them in position. These cribs were 50 feet x 20 feet with three ballast floors. Double sheeting made from 2-inch seasoned and dressed

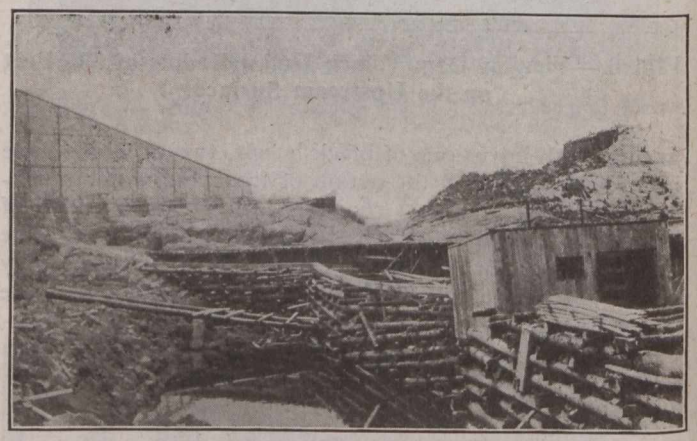

Fig. 10.—Tailrace Coffer-dam

spruce plank was then placed by the divers in the order in which the cribs were sunk, the force and direction of flow helping to hold the sheeting in position in the same manner as it kept the cribs tight against each other. Water-soaked logs were continually being driven in between the timbers of the crib, requiring much time and effort to keep the face clear for sheeting. Electric lights and telephones were, however, used in the deepest place, greatly expediting the work. While this work was under way is was observed that logs driven by the force of the current were smashing the sheeting, so a break-water was constructed