ment as well, placed their marks of approval upon the proposed plan of works. The company may use 56,000 cubic feet per second, sufficient to develop 160,000 electrical horse-power.

Headrace Construction.—The rapids at Cedars extend over a distance of about two miles. To concentrate this fall, a canal is being constructed along the north bank of the river, as shown in Fig. 1. The southern wall of the canal is built up from the rock excavated from the canal section, and is made watertight on the canal face by clay filling. This combination rock-fill earth bank requires special precautions against leakage or possible damage, the factors of safety being necessarily large. The type of construction, which is quite common in the case of large water reservoirs was considered to be the most economical, as all the materials were available at the site, and as the maximum head against the bank would never exceed 32 feet.

The water will be taken in above the Cedars Rapids between the Isle-aux-Vaches, forming the upper end of the dam, and the main shore. From this island to the power house there will be a length of canal of about 12,000 feet, forming a dam which concentrates about 32 feet of the fall. Fig. 2 is a view taken from Isle-aux-Vaches looking toward what will ultimately be the mouth of the canal. It shows the cableway used for the construction of the dyke extending the full length to the power house. The upper end of this earth bank, about 2,000 feet in length, is being constructed across a bay of the river and the material is being dumped from the cableway. The thin earth bank shown on the left is being retained at the present time to act as a cofferdam so that the main canal excavation may be carried on with steam shovels in dry ground.

The width of the canal on the water line will be about 1,000 feet. When finished its outer or south bank will be practically a straight earth wall two miles long and parallel thereto the shore forms a similar bank located on the natural flow of the river.

Ice Fenders.—The type of ice fender to be constructed at the upper end of the canal to divert floating ice from Lake St. Francis will consist of a number of submerged openings permitting the entrance of water into the canal at five or six feet below the surface. As this ice fender has the same general direction as the main current of the river, the ice which strikes the fender will be carried along by the heavy current and its own momentum, without entering the canal or impeding the entering flow. The usual precautions will be taken with respect to frazil ice, although in plants with these larger units a considerable amount may pass through the wheels without fear of causing interruption.

Power House Construction.—The power house will extend across the lower end of the canal forming a portion of the dam, giving, as stated, a fall of 32 feet. The building is 663 feet long, 140 feet in width, and from the rock to the top of the foundations is about 50 feet. The power house itself is being built of concrete, both foundation work and superstructure. The concrete work, at the present time, is finished to proper grade and the erection of the steel framework and superstructure is now being proceeded with. Fig. 3 illustrates the progress that has been made, three of the ten main units being completed and the others in a partial state. The method of construction of the draft tube for one of the main units is shown in the foreground. The illustration also shows to advantage the movable cantilever frame for the distribution of concrete. At this date work is in progress on the erection of the reinforced concrete units which are to form the power house superstructure. During the winter, and as rapidly as the foundation work will permit, steel will be assembled and these slabs put into place, so that waterwheel installation can go forward without delay.

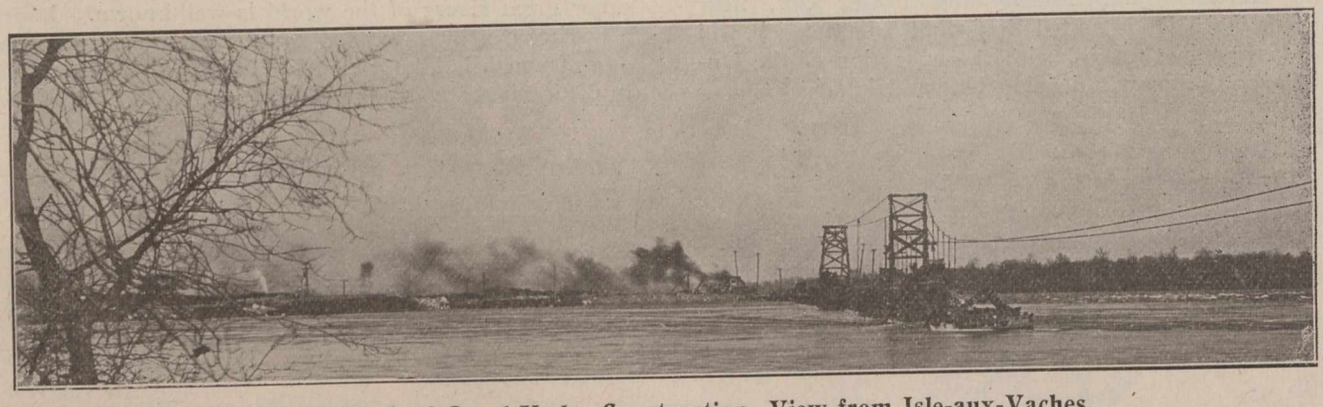

Fig. 2.—South Bank of Canal Under Construction, View from Isle-aux-Vaches.

Power Plant.—The great improvements that have taken place during the past few years in the design of low head water turbines and single-runner wheels at reasonable speeds to develop large amounts of power is being taken advantage of to a marked degree, although the policy has not been to endeavor to obtain the largest available units. The generating equipment includes twelve 10,800-h.p. waterwheels of the single-runner vertical-shaft type, which are to operate at 56 r.p.m. under a head of 30 feet. There will also be three 1,500-h.p. exciter units which will operate under the same head at 150 r.p.m. The plans for the final development call for eighteen 10,000-h.p. units. The size of each unit is stated to have been chosen more with a view to economic operation and confidence in its reliability than with the endeavor to save a small amount by greatly increasing the size.

The intakes are of the scroll or involute type. The water passes through the racks at the up-stream face of the power house into the reinforced concrete flume, thus entering the wheel, and discharging through a centre draft-tube into the tailrace and the river. The wheel chambers are of spiral shape, formed in the concrete foundations of the building. The generator for each wheel is to be located immediately above. The weight of the moving parts will be carried on a thrust-bearing located above the generator, readily accessible for inspection and maintenance, and easily reached with a crane