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PROGRESS ON THE SHANNON

3rd YEAR

JULY 1929

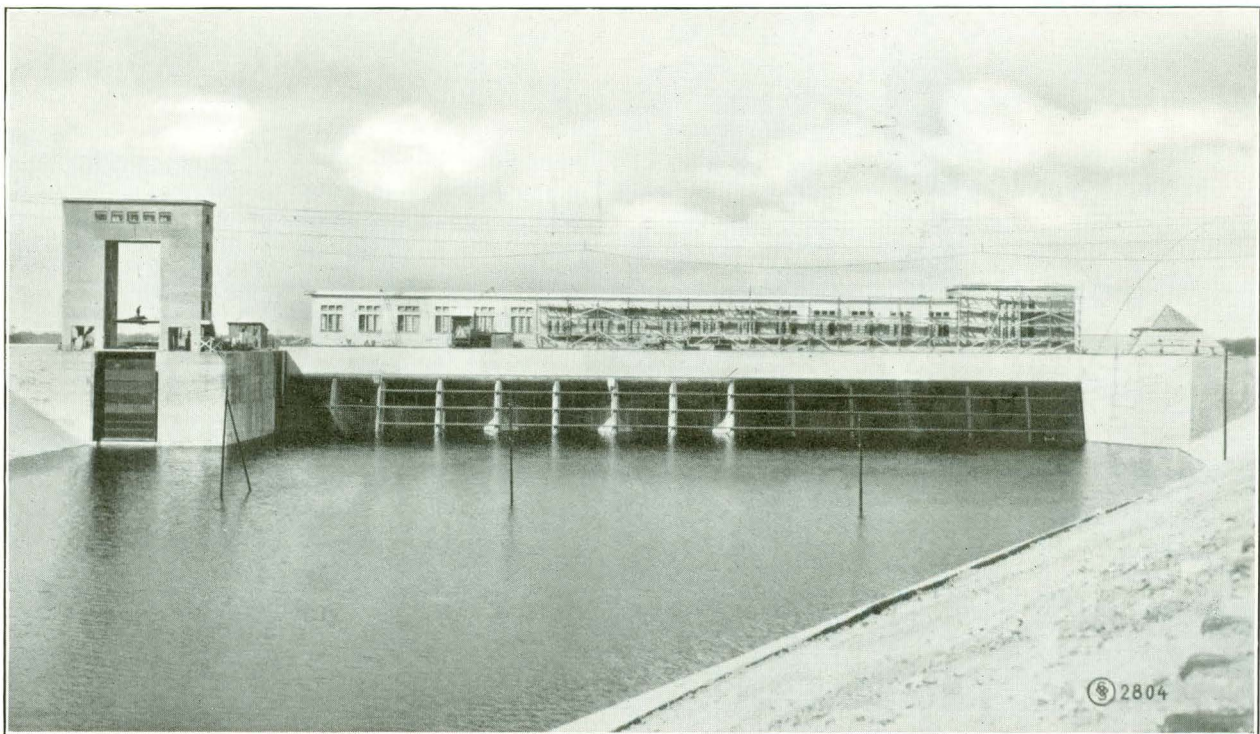
NUMBER 10

Locks at Ardnacrusha

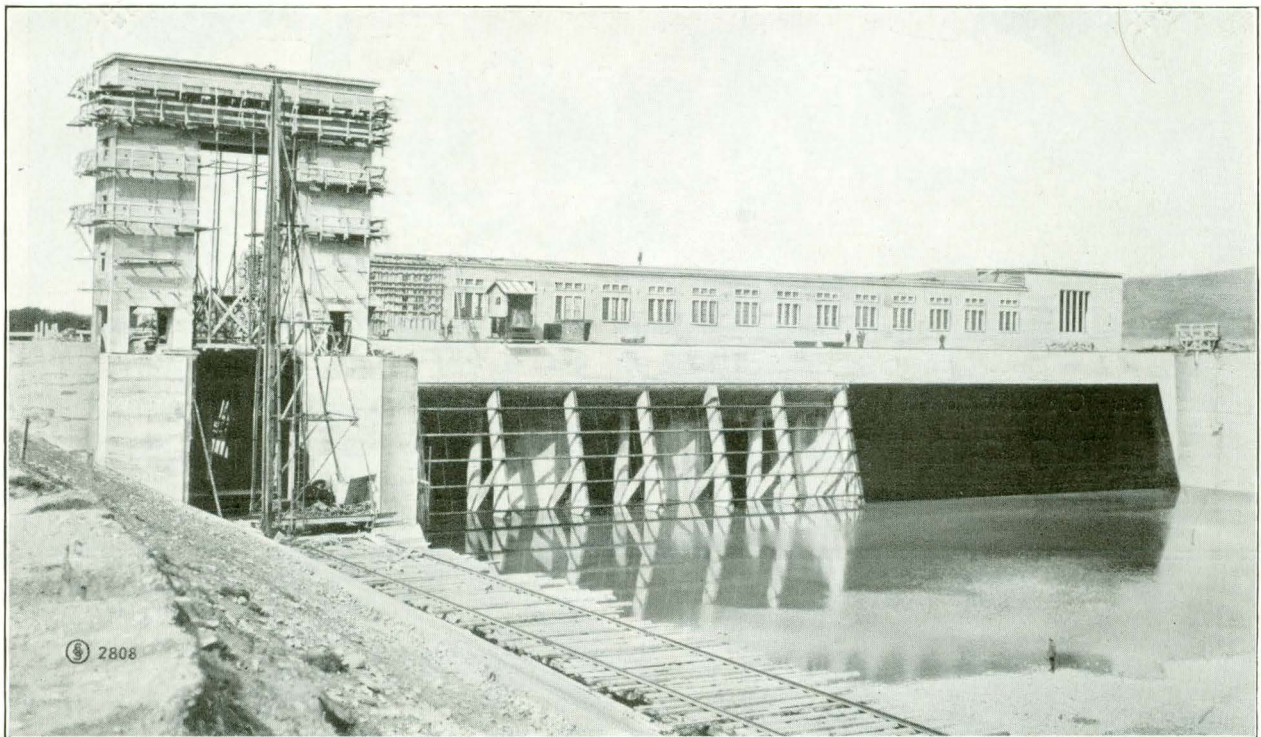
Part II

In Part I of the article on the locks at Ardnacrusha we described the lower foundation portion of the locks and the method of their operation. We will deal now with the superstructure and other details.

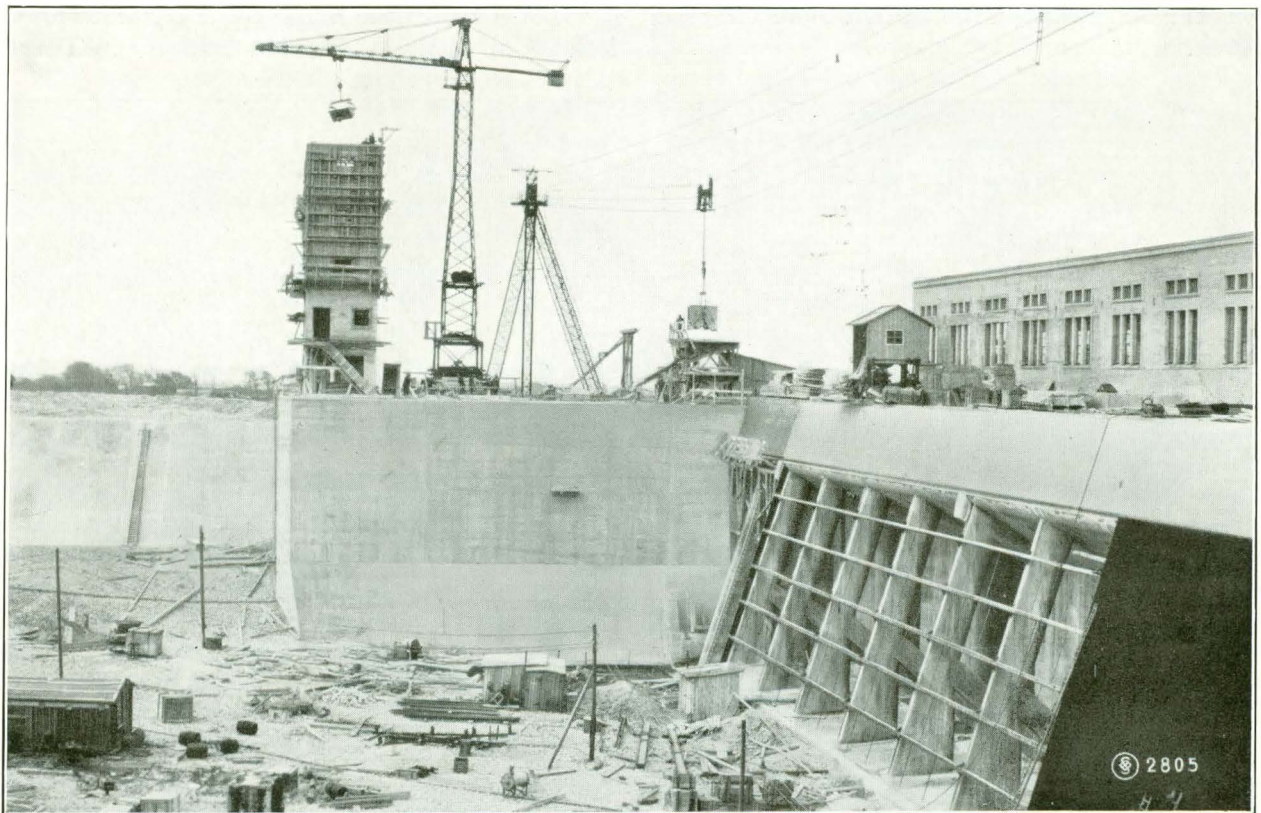
The upper lock is divided from the lower one by a gate and above that by a special vertical arch. The gate which is made of steel extends from level +13.35 — top of the filling chamber for the lower lock — to +21.00. Between levels +21.00 and



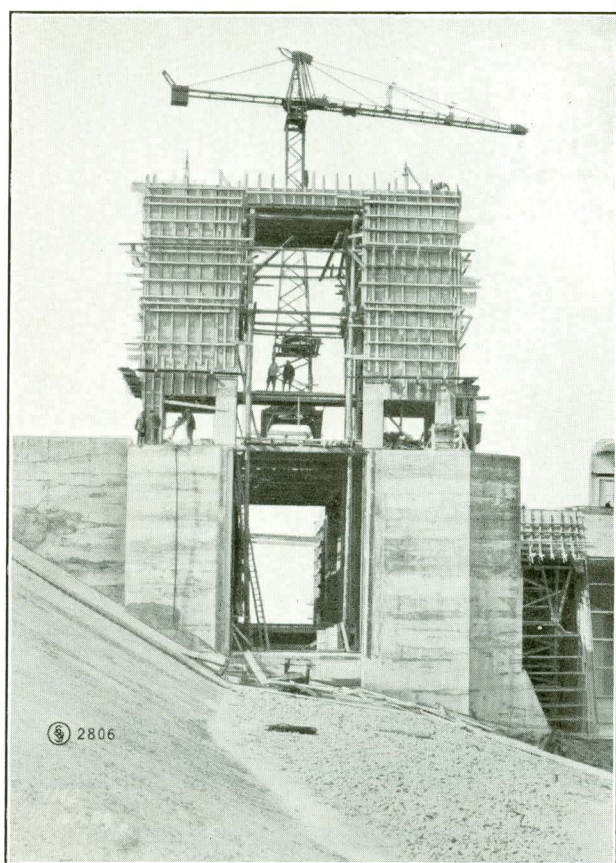
Entrance to upper lock from the Head Race and Intake Sluice House



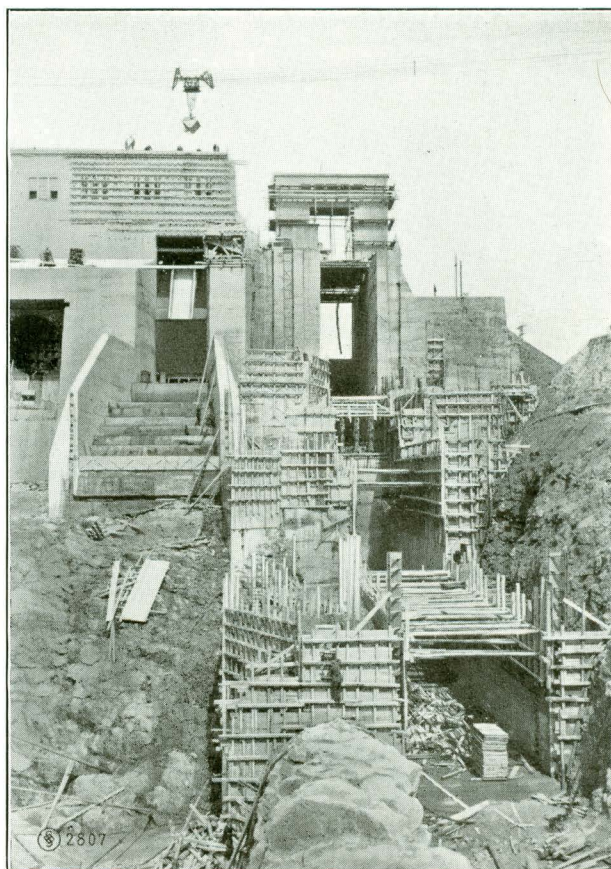
View of the Intake Sluice House, and upper lock and landing stage in course of construction



Erection of the superstructure of the upper lock as viewed from the right Head Race bank



Entrance to upper lock from the Head Race and the super-structure in course of construction

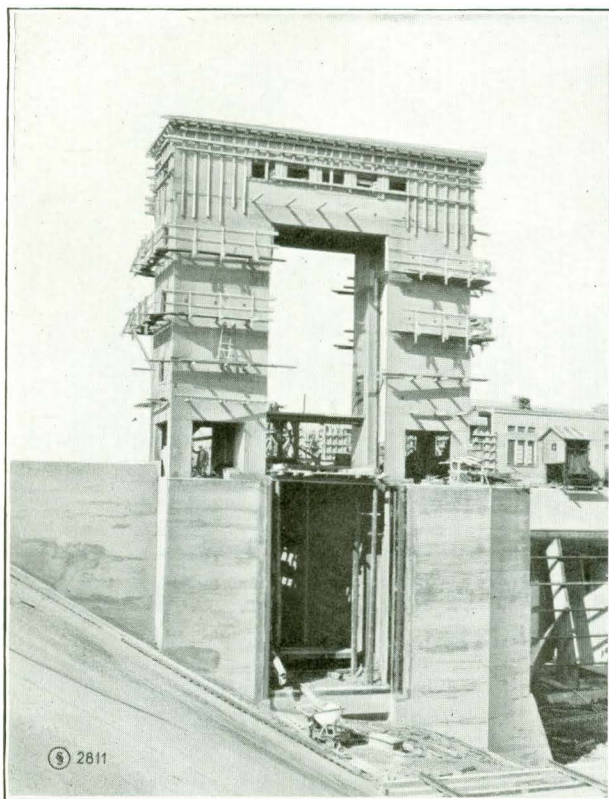


The upper and lower locks in course of construction

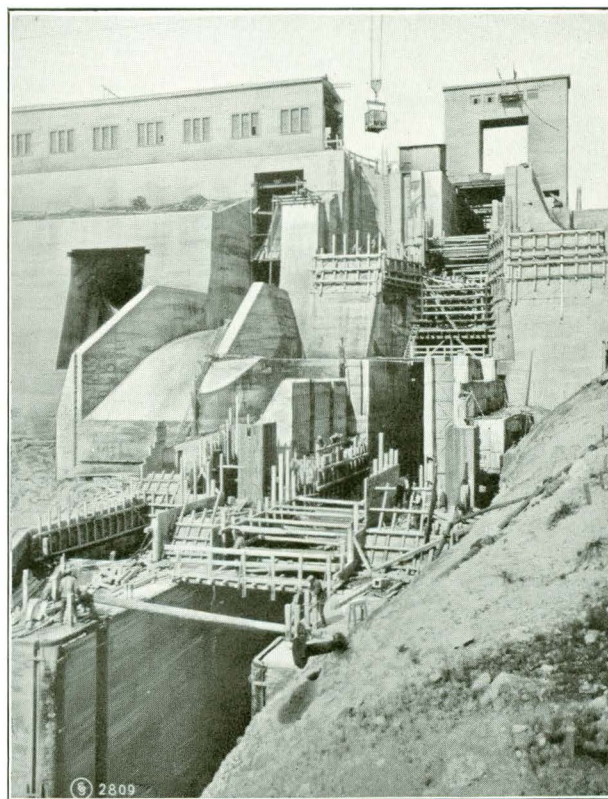
+ 36.50 the two side walls of the lock are spanned by the vertical arch. The arch had to be designed for the maximum water level of 35.70 in the lock, namely a pressure of 14.70 m. of water; it had furthermore to be perfectly water tight and made in such a way as to reduce the danger of shrinkage cracks to a minimum. The arch construction decided upon consists of 3 layers, two outside ones of heavily reinforced concrete and a centre one of a special elastic compound which is both perfectly water tight and can not crack as a result of temperature variations. The two reinforced concrete arch layers, being divided by the elastic, act independently of each other. The one on the upper lock side is only a thin concrete protection 0.15 m. thick for the elastic, all the load due to water pressure being taken by the other reinforced concrete arch layer which is accordingly much thicker and of a richer concrete mixture. Between levels + 21.00 and 24.90 the arch is of the "concrete filled" type. The upper lock face of the arch is thus straight between the two side walls 6.10 m. apart. The minimum combined thickness of all three layers of the arch at the crown is 0.95 m. and the clear rise 2.11 m. on the inside except for

a short bit between levels + 21.00 and + 21.90 where, in order to accommodate the water tightening arrangement for the gate below them, the above dimensions had to be increased to 1.25 m. and 2.36 m. respectively.

In order to save on concrete quantities the arch has been stepped in thickness, it is thus only 0.65 m. and 0.45 m. thick at the crown between levels + 24.90 and + 29.50, and + 29.50 and 36.50 respectively, all arches in plan being kept concentric. Furthermore between levels + 24.90 and + 36.50 the arch is of the true and not "concrete filled" type as below level + 24.90. The total amount of reinforcement used is just under 20 tons, a figure conveying well the strength of the arch. The springings of the arches have been well anchored into the side walls of the lock. The gate when lifting slides up the upper lock face of the arch where special water tightening arrangements have accordingly been provided. To safeguard the arch from the ships accidentally bumping into it a thick timber grillage spanning the two side walls immediately in front of the arch and a strong timber floating beam in front of that have been provided. The floating beam runs in special recesses some 2 metres



Entrance to upper lock



View of upper and lower locks

away from the arch and has been designed to withstand the impact of the biggest ships in the lock.

The lower lock and the navigation channel are divided from each other in much the same way as the two locks, namely by a steel gate between levels -1.05 and $+10.50$ and an arch similar to the one already described between that latter level and level $+17.70$. The combined thickness at the crown of all three arch layers is 0.95 m. thick between levels $+10.50$ and $+11.40$; 0.65 m. between $+11.40$ and $+13.50$ and $+0.45$ between $+13.50$ and $+17.70$. The portion between $+10.50$ and $+13.50$ is of the "concrete filled" type. The rise and radii of these stepped concentric arches, the timber protection grillage, the floating beam and the water tightening arrangement for the gate have been kept same as in the case of the arch for the upper lock.

The locks above the upper, middle and lower gates are spanned by gangways and service buildings housing the machinery for lifting the gates. The service building above the upper gate had to be built very high, namely to level $+50.20$, in order to have enough clearance for ships to pass under the gate when fully lifted and the full development water level of $+35.70$ in the Head Race. The top

of the building is reached by means of a staircase inside one of the two tower-like structures standing on either of the side walls. These have four floors and also accommodate the counterweights and guide recesses for the gates and a shaft for raising machinery parts etc. to the floor level of the service building at level $+50.20$. The building above the middle gate is larger than any of the other two, this was necessary in order to accommodate the operator's room. All the buildings and the gangways are of reinforced concrete including the flat V-shaped roof and were concreted by means of the cable crane. In addition a special tower crane, was used at the upper Head as the construction was too high for the cable crane to work alone.

The upper and lower lock between levels $+37.20$ and $+18.30$ and the lower lock and the navigation channel side walls between levels $+18.30$ and $+9.50$ are connected by staircases inside the walls. Special automatic water gauges have been placed at the middle and lower gate for recording the water level in the locks, a matter of extreme importance for the safe operation of the gates.

In conclusion one might mention that the entire construction of the locks has been planned with a view to ensure rapid and safe passage for the boats.