



SIEMENS

PROGRESS ON THE SHANNON

1st YEAR

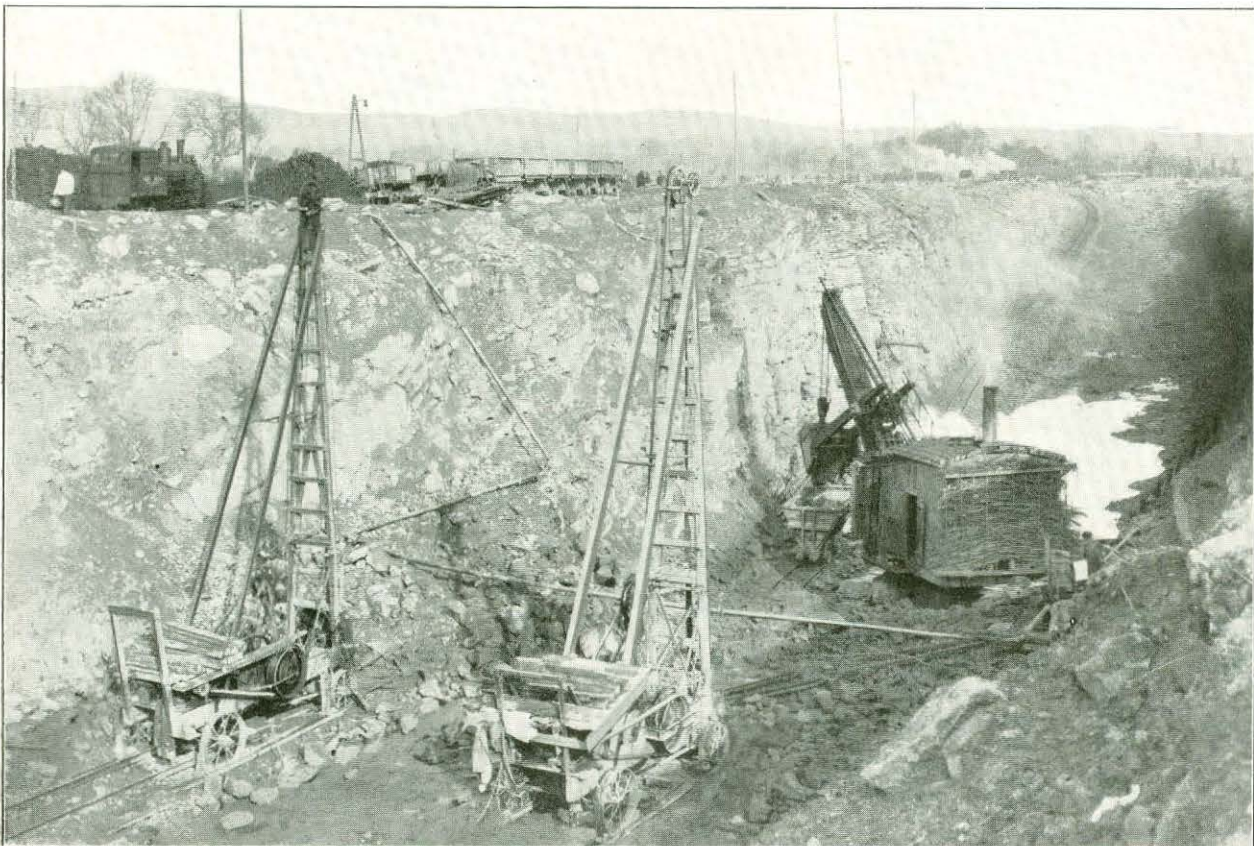
APRIL 1927

NUMBER 7

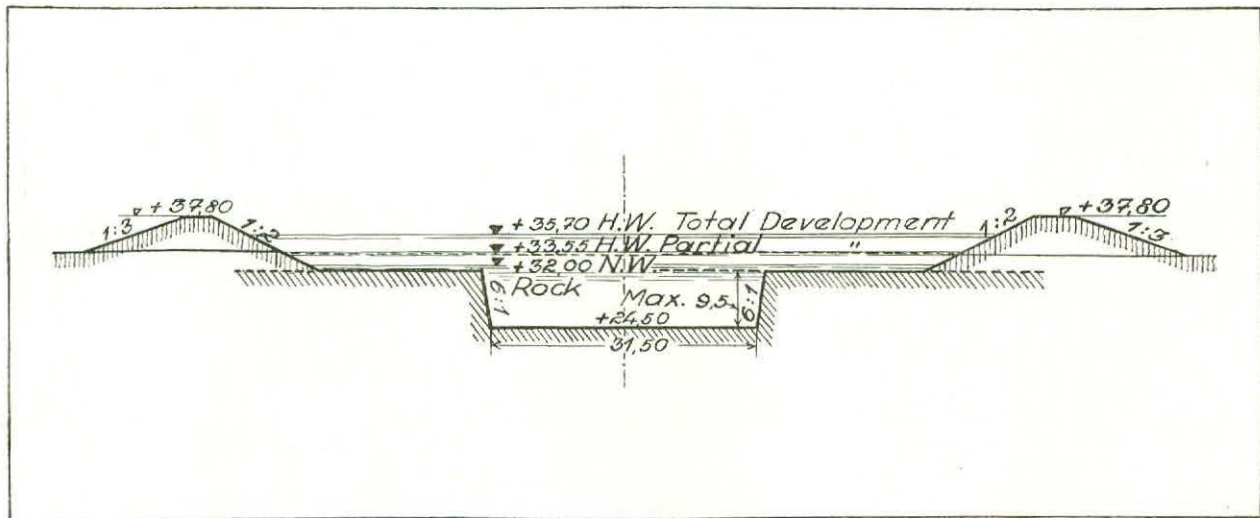
Rock Excavation on the Shannon

The sportsmen, who come to fish for salmon at the celebrated Shannon Falls above the City of Limerick, must be astonished this year at hearing large explosions at certain intervals

during the day time and sometimes even during the night. They must be surely reminded of guns firing at the Front during the years of the Great War, which is still fresh in the



Two boring machines and a shovel excavator in the Tail Race



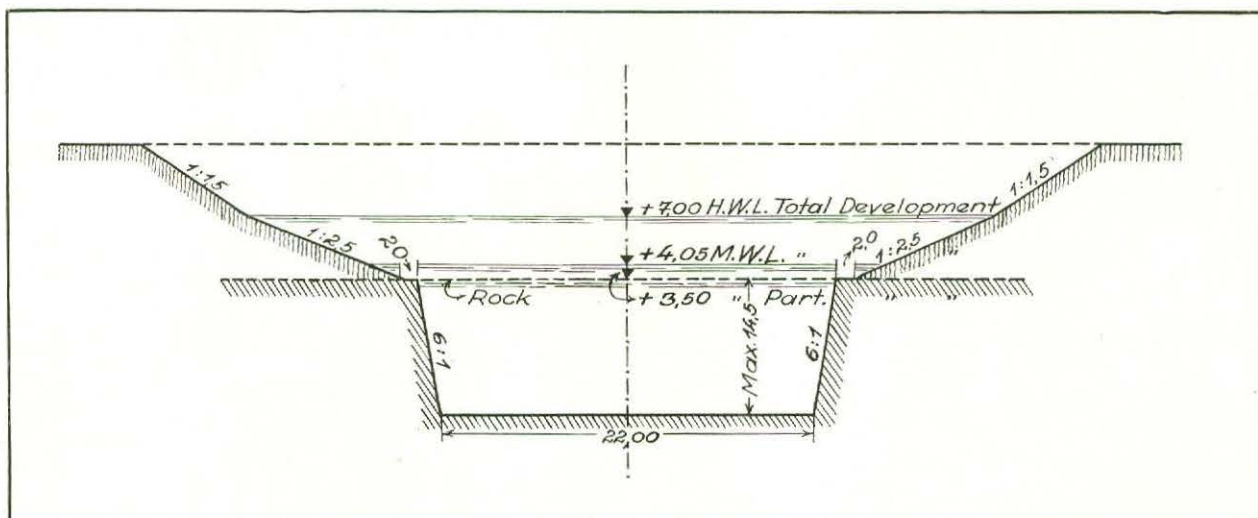
Head Race Cross Section in Rock Cutting

memory of many. On inquiring, they are told that this artillery fire is only the result of blasting operations, which have to be carried out in connection with the Shannon Scheme.

The canal cannot always be excavated in earth as described in our previous articles. In two sections of the Head Race, as in practically the whole length of the Tail Race, rock is found above the bed of the canal, which means considerable additional work and expenses which cannot be avoided. On the other hand, we welcome rock as a foundation for

the Power Station and the Weir, as these structures will only be made more solid by being built on rock.

The total amount of rock which has to be excavated amounts to approximately one million cubic metres. Of this quantity, the bulk amounting to over 600 000 cbm. is in the Tail Race and at the Power Station. 300 000 cbm. have to be removed on the Head Race near Clonlara and above O'Briensbridge. The rock above O'Briensbridge can be geologically classified as belonging to the Devonian or old red Sandstone. Below O'Briensbridge



Tail Race Cross Section in Rock Cutting



Shovel excavators and boring machines in the Tail Race

near the City of Limerick, we have exclusively come across Carboniferous limestone with occasional erratics on top, deposited in the glacial period.

Our drawings show normal cross sections of the rock in the Head and Tail Races. The Head Race is now being excavated for the Full Development. The bottom of the canal



Shovel excavator on caterpillars

is being cut in the rock 31,5 m. wide. The banks of the canal attain a height of nearly 10 m. At present the Tail Race is only being excavated for the requirements of the Partial Development, with a canal bed 22 m. wide and here the deepest cut in the rock is 15 m. The slopes of the cut are 6 : 1. Irregular pieces and protruding corners are being removed, so that no danger to navigation can possibly arise.

Naturally the loosening and transport of these large rock quantities cannot be done by methods which are used in small stone quarries. This would be impossible during the short Contract period and in consequence machinery has to be made use of for this purpose. The first procedure is to drill bores into the rock and, after this has been done, blasting operations can be undertaken. Experience has shown that satisfactory progress cannot be achieved by using compressed air boring machines for the rock which has been found near the Shannon. The drills get caught before they have gone down very deep into the clefts and crevices of the stone. Also before new bores can be undertaken, the rock surface must be cleared of the loosened material, and this involves considerable delay. By using boring machines with drop hammer, all these difficulties can be got over. These machines are really built on the principle of the oldest and most primitive boring appliances with the adaptation of modern technique. They have got a heavy chisel which falls down at regular intervals and

shatters the rock. Any number of vertical bores can be made to any depth required without interfering with the work of the excavators. When compressed air was used, bores could only be made when the excavators had cleared away the loose rock.

To give an idea of the efficiency of the above named method, we can mention that, for example on the Tail Race, 3 bores of 200 mm. inner diameter are sufficient to blast approxi-

mately 1000 cbm of rock, and in this case the height of the rock face is 6 m. For finishing the work, such as the removal of protruding pieces on the bed and sides of the canal, as well as the splitting up of larger blocks, the compressed air boring machines are still used. Ammonite and Ammonite-gelatine, which are the explosives used, are safe in case of fire or frost, and cannot be exploded by blows or ordinary concussion.

The rock is loaded on all the Building Sites by means of shovel excavators with a capacity of 2 cbm. each. These excavators move partly on rails

and partly on caterpillars. The normal loading capacity of each excavator is 200 cbm. per shift, and special trucks are used for this purpose. These trucks have a capacity of 4,3 cbm. each, and are constructed of steel as they must be specially strong for the transport of the rock. We can mention that these trucks have proved to be most efficient on our previous works in the Black Forest (Germany).



Boring machine with drop hammer