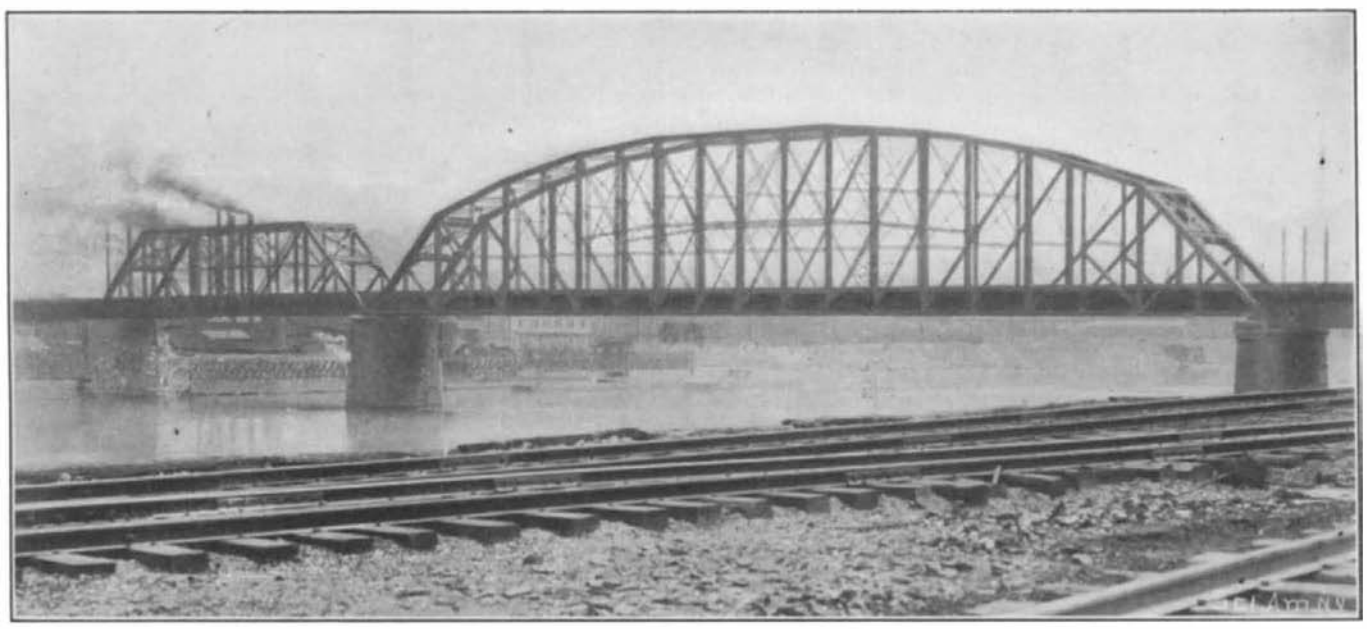
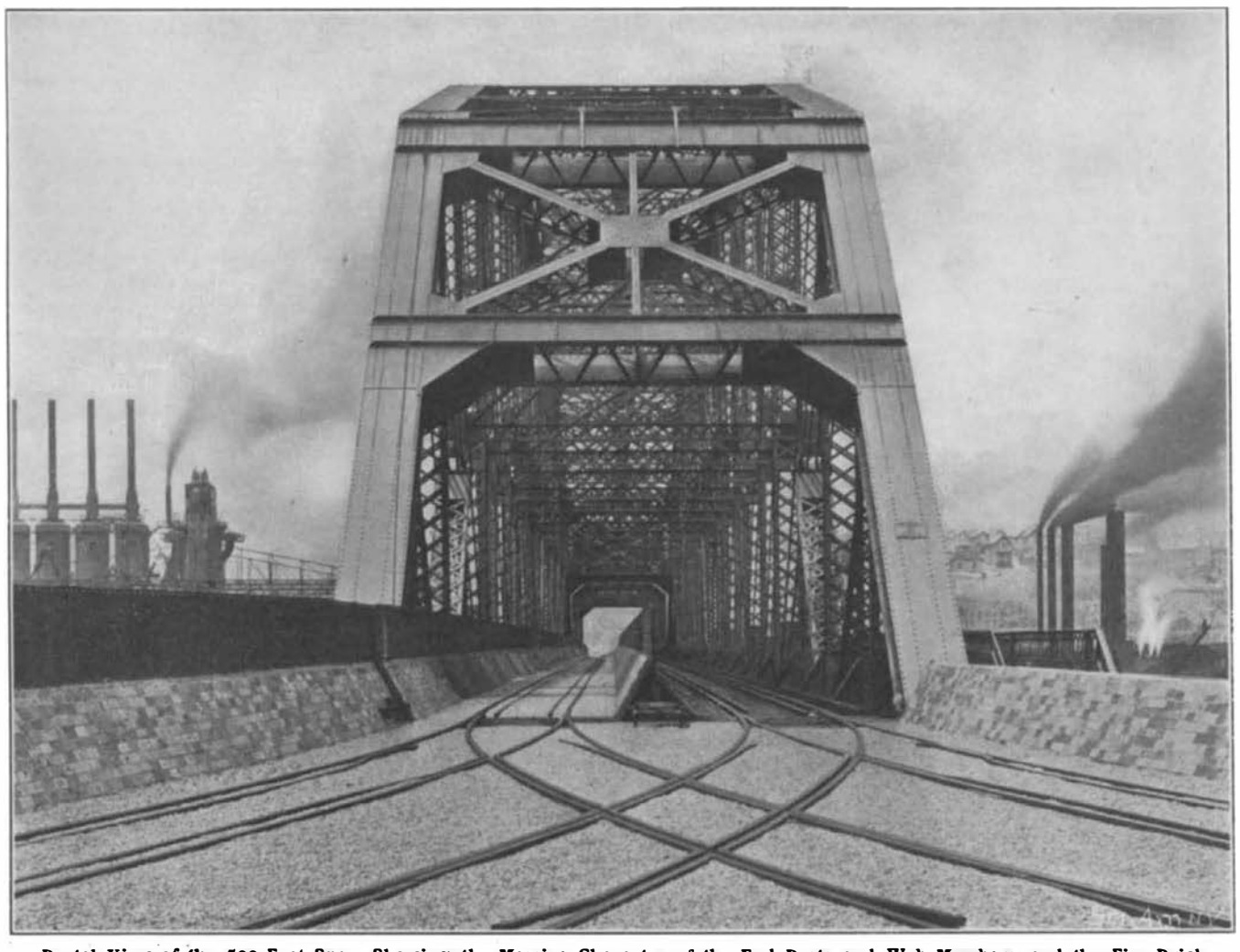
RANKIN BRIDGE FOR THE TRANSIT OF MOLTEN IRON.

The massive and handsome bridge which forms the subject of the accompanying illustrations was built over the Monongahela River, by the Union Railroad Company, for the purpose of bringing ore and other furnace material into the Carrie Furnaces at Rankin, and also to enable hot metal in ladle cars to be transported from the Carrie Furnaces to the Homestead Steel Works, both of the Carnegie Steel Company. The general plan of the bridge, which was erected in 1900, was prepared by Mr. W. H. Smith, the chief engineer of the Union Railroad Company, but the bridge proper was designed by, and erected under, the direction of Mr. Emil Swensson, at that time chief engineer and superintendent of the Keystone Bridge Works. We are indebted to both of these gentlemen for courtesies extended in the preparation of this article. The crossing of the Monongahela consists of two truss spans, one 252 feet in length and the other, over the main channel of the river, 500 feet in length, with two approaches, one 856 feet, and the other 286 feet in length. The chief interest of the structure centers in the great 500-foot span, not so much on account of its length (for longer fixed truss spans than this have been built) but on account of the great weight of the truss itself, the total weight of steel amounting to about 2,800 tons, or 5.6 tons per foot. This is considerably the heaviest double-track span of its length built to date. The great weight is due, partly to the extraordinarily heavy freight locomotives, and the large capacity of the steel cars, used by the Union Railroad, and partly to the special system of roadway protection for the bridge which has been rendered necessary.



One 252-Foot and One 500-Foot Span; Weight of Larger Span About 2,800 Tons.



Portal View of the 500-Foot Span, Showing the Massive Character of the End Posts and Web Members, and the Fire-Brick Protection Against Molten Metal.

THE RANKIN BRIDGE FOR TRANSPORTING MOLTEN METAL ACROSS THE MONONGAHELA RIVER TO THE HOMESTEAD WORKS.

For the protection of the steel in the bridge against the cutting action of the molten iron, and also to protect the boats passing up and down the river from any molten metal that might splash over in transporting the ladle cars, the downstream track was fireproofed.

The construction of this fireproofing consists of putting I-beam joists on the stringers, and completely covering said joists with steel plates, on which plates the rails are fastened. These plates are extended first on a 45 deg. angle, and then vertically, as a fence, about 8 feet above the rail. The floor plates are then lined on the inside with fire bricks, said fire bricks extending to the top of the 45 deg. incline. The horizontal surface of the fire bricks is next covered with fine gravel, almost to the top of the rails. This makes what is called the hot-metal track, or route, between the Carrie Furnaces and Homestead Steel Works, the object of which is to take the molten iron quickly across to the open-hearth furnaces at Homestead, and then convert it into steel, without loss of the heat in the molten iron; this, of course, saving the remelting of the iron. It will be seen from the photograph showing the portal of the bridge, that at the Homestead end of the structure the tracks diverge, directly at the end of the 500-foot span, forming a Y. Each leg in the Y is single-tracked, but is connected with both tracks on the span; the entire bridge, from this point, being double-tracked. The tracks on the Y are on sharp curves, and also on grade, which, together with the system of switches, at the end of the span, made it a rather complicated steel construction at this point.

On the curved portion of the viaduct at the Rankin end, the steel construction carrying the hot metal had to be made of dimensions to suit the fireproof protection, inasmuch as the fences had to be spread to proper distances to permit the passing of the cars.

Consul Hill reports from Amsterdam that the necessity for United States manufacturers to adopt the metric system in foreign trade becomes daily more imperative. A firm in Holland received this week a cable offer from New York for 2,000 barrels of potatoes. As this was a new business, the question at once arose how many pounds were there in a barrel of potatoes—American pounds, too, as the Dutch pound differs from ours. A whole day was lost before the answer could be wired. Had the offer been made in kilogrammes, every business man in the commercial world from Vladivostock to Mauritius would have understood it instantly.

Electric Discharge and Capillary Action.

M. S. Lemstrom has made some interesting experiments to show the effect of electric discharge upon capillary action. A capillary tube is plunged in a vessel of water, and the latter is connected to one coating of a Leyden jar. The other coating is connected to earth, and the coatings are also connected to the two balls of a spark micrometer. Above the tube is placed a metallic point which is joined to one pole of an influence machine, the other pole of the machine being grounded. The discharge thus passes from the point across the air to the water. When the point is joined to the positive pole the meniscus is seen to rise along the walls of the tube and at the same time one or more minute drops of water are formed at the edge. The result is not always the same as regards the number of drops which are formed in the same interval of time, even when the intensity (as measured by the number of sparks) is the same. When the point is raised to a considerable distance above the water, this phenomenon is still observed, but the drops cease to form at a distance of 30 inches, after which the meniscus still continues to rise, however. The quantity of water thus raised depends upon the amount of discharge, the distance of the point from the water, the diameter and length of the tube and the various resistance of the circuit. It seems to be proportional to the time during which the discharge passes, at least in the first instance. Diluted solutions of various salts act in the same manner as water, but the quantity raised is smaller. As may be expected, the discharge has also an action upon the capillary tubes of plants and this the experimenter shows by placing above the capillary tubes of the plants a sheet of wire gauze provided with small points. The machine is connected to the gauze and to earth. He finds that the activity of the plant is increased when the gauze is joined to the negative pole of the machine, in which case, as above, the discharge tends to favor the rise of the sap in the capillary vessels of the plants.

The Current Supplement.

The current SUPPLEMENT, No. 1353, has an interesting article devoted to shell experiments, "Recent Experiments in Attacking Armor with High Explosive Shells." "Liquid Hydrogen" is by Prof. Dewar. "Enameling—V" is continued. This is the most important series of papers on the subject ever issued. "Arc Lamps for Blue Printing" describes a new use for the electric light. "Pictet's Oxygen Separation Process" is accompanied by an interesting diagram. The usual Trade Suggestions from United States Consuls and Trades Notes and Receipts are published. The first part of the "Report on the New Croton Dam" is given.