

**The Knowledge Bank at The Ohio State University**  
**Ohio State Engineer**

**Title:** Hydraulic Fill

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**Issue Date:** Mar-1927

**Publisher:** Ohio State University, College of Engineering

**Citation:** Ohio State Engineer, vol. 10, no. 3 (March, 1927), 22, 28.

**URI:** <http://hdl.handle.net/1811/33884>

**Appears in Collections:** [Ohio State Engineer: Volume 10, no. 3 \(March, 1927\)](#)

## HYDRAULIC FILL

Abstract from Engineering-News Record, October 21, 1926, by Reed D. Achauer, Ambridge, Pa., "Hydraulic Giants Place Slag Fill."



THE Duquesne Slag Products Co. has charge of a combined waste disposal and land grading operation on the property of the Kenilworth Land Co., between the Pennsylvania R. R. tracks and the Ohio River about fourteen miles west of Pittsburgh. The 60-acre fill, 20 feet deep, is made easy by using hydraulic power from the Ohio River. Granulated blast furnace slag is used for the fill.

The railway was the obvious means of delivering. This, coupled with the proximity of the river, suggested the hydraulic method of placing the fill. The area to be filled was fenced in by earthen dikes reinforced by  $\frac{1}{2}$ -inch wire meshing, which in turn was supported, where necessary, by posts. The slag is carried in hopper cars of 50-ton capacity. These cars run over standard gauge racks on embankments slightly higher than the required height of the fill. These tracks are torn up and laid down nearer the fill as the work progresses.

A pump boat with two 10-inch centrifugal pumps, driven by 200 h. p. electric motors, was anchored close to the scene of operations. Current for the motors is transmitted from the bank of the river through power lines. The intake was suspended on a pontoon, thus keeping the pipe under water regardless of the rise and fall of the river. After passing through the pump boat, the water flows to the main feed line by means of pipes supported on pontoons and connected together by rubber gaskets. The main feed water line was constructed of 15-inch light gauge sheet steel pipe which was supported by a rude trestle slightly higher than the required fill.

Portable gantries are set up over the tracks. As the fill progresses these are moved along the tracks to another position. Four of these gantries are in use. A sluice pan 30 inches deep, 15 or 20 feet long and made of  $\frac{1}{2}$ -inch sheet steel, is inserted through the embankment, flush with the tops of the ties and directly under the gantry. The main feed line is tapped and a smaller pipe with a tapering nozzle is brought up to the end of the sluice pan. When both pumps are working, a force of 120 pounds can be maintained at the nozzle of the sluice gun. Another pipe runs to the top of the gantry with a similar nozzle pointing down. This is called the tower gun and operates under the same pressure as the sluice gun. A hopper car filled with slag is placed in position beneath the gantry so that its hopper will empty into the sluice pan. The tower gun shoots water into the hopper car and forces the slag into the sluice pan. The sluice gun keeps the pan clear, washing the slag into the fill where a booster helps distribute the slag over the fill.

The booster is a tapering pipe with a nozzle diameter of 2 to 4 inches, and operating on an apparatus of homemade wood construction. When both pumps and the pump boat are working, the booster has a nozzle pressure of 120 pounds and can throw a jet of water almost 400 feet, maintaining an effective velocity head for 200 feet. However, the pressure is generally 90 pounds, with a spreading range of 25 to 60 feet. Where

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the fill is farther away, the sluice pan is lengthened by adding more sections of trough. The same is true of the booster pipe.

This operation has been going on night and day, summer and winter, for the past several years. At night search lights are operated from the tops of the gantries, while in the winter the slag is thawed out of the hopper cars by running them into thaw houses which are heated by steam lines on the ground between the tracks.

By the method just described a hopper car averaging 50 tons of slag can be emptied and placed in the fill in five minutes.

H. S. HOSKINS, '30.