

## A BRIDGE FOR CARRYING MOLTEN IRON.\*

In a short time the Carnegie Steel Company will be using molten iron from the Carrie furnaces at the Homestead Steel Works, situated diagonally across the Monongahela River from the blast furnaces. The bridge is being built at Rankin station, a few miles up the Monongahela River from Pittsburgh. The purpose of its erection is primarily to utilize the molten iron from the Carrie furnaces at the Homestead mills and secondarily to give the Union Railroad, one of the Carnegie interests, a right of way to the Carrie furnaces. Ore and other material used at these furnaces now comes by way of the Baltimore & Ohio and Pennsylvania railroads. From an engineering standpoint the bridge is noteworthy.

At the present time the hot metal that is used at the Homestead Steel Works is brought from the furnaces at Duquesne, a distance of nearly  $4\frac{1}{2}$  miles. The new route from the Carrie furnaces to Homestead is less than 1 mile in length. Furthermore, since the steel producing capacity of Duquesne is being largely increased it will soon require all the metal produced at the adjoining furnaces. In addition, the molten iron in transit from the Duquesne furnaces loses much of its initial heat. And this is not at all surprising since from the time the iron is tapped from the furnaces until it reaches the mixers nearly an hour elapses. It is estimated that the time from the furnaces at Rankin to Homestead will be at the most 20 minutes. While no trouble has been experienced from the loss of initial heat under the present arrangement, the shorter route will mean a saving in fuel at the steel works.

The main span of the bridge is 500 ft. in length and will weigh, approximately, 2,500 tons. For its length this span is one of the heaviest in the world, for a two-track bridge. The shorter span, which is already in place, is 252 ft. in length and its weight is in proportion to that of the longer span. When completed the bridge will weigh approximately

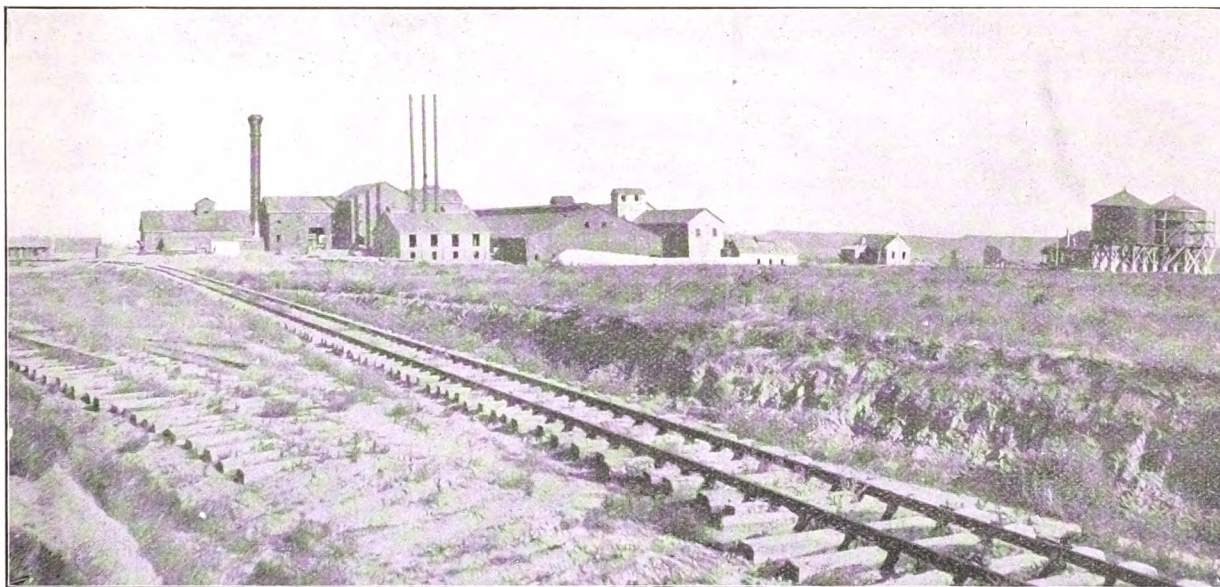
tion. It is only a few months since the piers were completed and the trestle work commenced. The erection of this bridge adds another hot metal route to the other two now extending across the Monongahela River. The Port Perry Bridge has been doing service for the Carnegie Steel Company for several years and is now in use, and Jones & Laughlins, Limited, are completing a hot metal bridge across the Monongahela River from Eliza Furnace on Second Avenue in Pittsburgh to the company's South Side steel works. The Rankin hot metal bridge was designed by W. H. Smith, chief engineer for the Union Railroad.

## MICHIGAN COAL MINES IN 1900.

Under the Michigan inspection law of 1899 the commissioner of labor was given authority to collect certain statistics, relating to labor, wages, products, coal, etc., which had never before been gathered, and which are presented in a bulletin just issued, which covers the 9 months ending September 30th last.

For these 9 months 26 coal mines have been in operation in Michigan. These mines are principally located in the Saginaw Valley, although Shiawassee County has 2, Jackson County 1, and there are 5 small drift mines near Grand Ledge, in Eaton County, these latter being operated by only a few employees, using no powder and but little oil, the owners generally working with the men in taking out coal. These 5 mines have averaged about 540 tons per month.

The monthly reports from the managers of the mines show an aggregate of 1,600 employees at work, an average of 62 for each mine, although 3 of the mines have over 150 employees all the time, several others approximating 90 employees each. A large per cent. of the miners are paid by the ton for their work, their working days averaging only about 7 hours each. Of course surface men and certain other employees



MILL OF UNION GOLD EXTRACTION COMPANY AT FLORENCE, COLO.

9,000 tons. The total length is 2,300 ft. and in addition to the two tracks there is a sidewalk. One track will be for hot metal trains exclusively, and the other for taking ore, limestone, etc., to the Carrie furnaces and for the transportation of slag from the furnaces. The hot metal tracks will be entirely inclosed in steel below and on the sides. The purpose of this is to protect passing vessels from the hot metal in case it should splash. In addition it is a protection to the steel entering into the construction of the bridge. With hot slag from the furnaces the same precautions do not have to be taken, as it does not retain its initial heat like the molten iron, and should it fall from the ladles it will not be hot enough to damage passing steamers or to injure any of the steel parts of the bridge.

The ties carrying the hot metal track will be of wood and will be well protected from the molten metal. The tracks will be guard-railed and on either side will be inclosed by steel plates,  $\frac{3}{8}$  in. in thickness and reaching to a height of 4 ft. For a distance of 6 ft. above this there will be plates  $\frac{1}{8}$  in. in thickness. The heavier plates will be clamped to the tracks and in addition will have a fire-brick covering. Sand will be filled in between the ties and will be spread over them.

The bridge contains some of the heaviest pieces of structural material ever put in a similar structure. There are eight girders and they range in weight from 59 to 70 tons. The patten posts of the main girder are 48 in. in width. The channel span will be a trifle over 81 ft. between centers of bottom and top chords, the bottom chords being composed entirely of steel bars 10 in. wide and ranging in thickness from  $1\frac{3}{8}$  to  $2\frac{5}{16}$  in. The top chord will be 48 in. wide and 36 in. high, having four web plates extending the entire length of the span. These chords are in sections of 53 ft., weighing from 36 to 38 tons each. The end posts will be 78 ft. long and will weigh about 52 tons each. Adjoining the big span are two deck spans, 122 ft. 3 in. long, made of plate girders, weighing from 51 to 70 tons each. At the Homestead terminus there is a Y, the tracks leading to Duquesne and Homestead steel works respectively.

The bridge is being built by the Keystone Bridge Works of the American Bridge Company, and rapid work has been done in its erec-

average more than this, but in no case do they exceed 10 hours per day. While 26 days is recognized as a month's work at most kinds of employment, the miners, for certain reasons acceptable to operators and employees, only average about 20 days each month, work under ground being of such a nature as to preclude constant employment.

The aggregate daily wages paid to the employees is \$3,724, or an average of \$2.33 paid each employee per day. The average daily wage of many of the larger mines is over \$2.50. It is noticeable that in some of the mines in the heart of the mining district the wages approximate \$2.90 per day.

All the mines use more or less illuminating oil, those before mentioned at Grand Ledge using but a small amount. The monthly consumption of oil for the 26 mines, for the first 9 months of the year, aggregated 13,898 gallons, or 1,544 gallons for each month, being about 60 gallons for each mine.

Powder for blasting purposes is used in 20 of these mines, the aggregate for the 9 months being 27,909 kegs of 25 lbs. each, an average for each month of over 3,000 kegs, or an average of 155 kegs monthly for each mine using powder. It is probable that there will be over 1,000,000 lbs. of powder used in the coal mines of Michigan during the current year.

For the 9 months covered by this bulletin there was mined in Michigan 613,408 tons of coal, an average of 68,156 tons for each month, or an average for each mine of 2,621 tons monthly—this means for all mines, both large and small. There are a few mines in the Saginaw District that approximated 7,000 tons monthly.

The total cost of the entire output of these 26 mines for the 9 months was \$838,937, or a monthly average of \$93,215. The monthly average for each mine is \$3,547. Several of the larger mines are paying out over \$12,000 monthly. The average cost per ton for the entire 26 mines is about \$1.40, although it has cost some mines as high as \$2 per ton to take out the coal.

Within the past month 8 new mines have been put in operation and are now taking out coal, and it is probable that the coming year will see 40 mines in operation. The output for the 3 remaining months of the year will exceed that of any previous 3 months of the year. Some of the new mines will be operated on an extensive scale.

\*Abstract of article in the Cleveland "Iron Trade Review."