## CONNELSVILLE COKE

The first step in the manufacture of coke is the mining of the coal. In the infancy of the industry, the mining operations were carried on somewhat aimlessly, resulting in loss of much coal, but years of experience and the increased value of the coal have brought about much better methods. The double entry system of mining is used in the region, and about eighty-six per cent. of the coal is recovered. Under this system, parallel headings or entries nine feet high are driven; the rooms twelve feet in width are turned off at right angles from these, and the ribs are drawn as the miners retreat. The coal is carried to the surface in wagons or small cars of about two tons capacity, and dumped into the bins. From these it is drawn in steel cars or larries of from six to eight ton capacity out on the ovens and dropped through the tunnel head, or opening of the crown, into the oven. In dropping into the oven the coal naturally assumes a pyramidal shape and must be leveled. This operation consists in leveling the coal to an even height all over the oven, and is performed by a man with a scraper attached to a piece of pipe about fourteen feet along. The oven door is then built up of brick and daubed with a mortar composed of loam and coke ash dust. When the oven is first put in blast the charge of coal is ignited by means of wood and hot coal or coke, but when in regular operation the charge is ignited by the heat retained in the oven from the coking of the preceding charge. When the oven is in good condition it usually requires about one-half hour for the charge to ignite. During the period of initial heat a very light bluish smoke issues from the oven which gradually increases in quantity and darkens in color until the oven goes off with a puff and the coal is burning. The amount of coal charged varies as the length of the burning period is decreased or increased. Coke which has been burned 72 hours is usually called foundry, while that burned 48 hours is called furnace coke. After the oven has been burned the requisite number of hours it is said to be burned off, the door is torn down, and the red hot mass of coke is quenched or watereed by the drawer. Water is squirted into the ovens by means of a gum hose and a three-quarter inch steel pipe about eight feet long. The watering process consumes about one-half hour and about eleven hundred gallons of water per oven. The coke is then drawn by means of a scraper, similar is that used in leveling, loaded in barrows and wheeled to the cars. As in all other industries, modern mechanical devices have been adopted in the region to increase the safety of the employees, to save time, reduce labor and to overcome the evils of an insufficient lagor supply. The modern steel fan with a capacity of from two to four hundred thousand cubic feet of air per minute, has replaced the old ventilating furnace; electricty and compressed air are taking the places of the mules on the mine, haulage roads and on the larry tracks; an electric driven coke drawing machine is drawing and loading a large amount of coke each day; (by January 1st next about 40 of these machines will be in operation in the region); at the most modern plants, the waste heat from the ovens is utilized

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to fire the boilers; the mine water is pumped by electrically driven pumps; concrete and steel are replacing wood in the construction of tipples, bins, and trestles, and the silica brick instead of the old fire clay, is now used universally in the construction of the crowns. The first silica brick oven in the region was built at the Valley Works of the H. C. Frick Coke Company in the spring of 1893, and to-day after fourteen years of continuous service the oven is as good as new.

## INVENTION THAT MAY TAKE PLACE OF TURBINE.

The question as to whether the turbine engine—which in recent years has revolutionized marine engineering—is about to be surpassed is suggested by an invention made by a Scotch marine engineer living in Liverpool. He has brought to perfection a "Radi al" engine. This inventor, who is a chief engineer on a well-known Liverpool liner, in an interview with a press representative, said that for many years there had been a hunt for the ideal engine. Parsons tried to do it by getting right away from the reciprocating engine, but he failed to reach his ideal, because he could not get a steam-tight piston. "The idea of my radical engine," added the inventor, "came to me in the night when I was on the ocean. Giving up the idea of getting a steam-tight piston on the rotary principle, I applied myself to the problem of getting a radical piston with steam direct upon it. My idea was to get the full pressure of the steam on one piston, and no back pressure on the one following."

This is his invention, and the advantages he claims for it are the direct push around instead of the stopping and starting at each end of the stroke, as in the case of the reciprocating engine, that with its steam-tight piston the steam must do its work or remain in the boilers, and that it can take the full benefit of the steam pressure, and also the steam's velocity, whereas the turbine depends on velocity alone. Although the tests are not complete, the inventor considers his engine will be one-third better than any oher engine of equal piston area, and that its expansion will considerably exceed that of the ordinary reciprocating engine. The cost would be much less than that of the turbine engine. It had the same power astern as ahead, could go at any speed, and was so simple there was hardly any possibility of anything going wrong. The engines has been inspected by many marine engineers. It has been protected in all parts of the world, and a big German firm have already made a substantial bid for the patent rights. There is no part of the engine that could not be made in a small engine shop. It needs the smallest amount