UNITED STATES PATENT OFFICE.

JAMES E. ATWOOD, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN THE MANUFACTURE OF BESSEMER-STEEL-CONVERTER TUYERES.

Specification forming part of Letters Patent No. **144,726**, dated November 18, 1873; application filed November 7, 1873.

To all whom it may concern:

Be it known that I, JAMES E. ATWOOD, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Bessemer Steel, of which the following is a specification:

This invention has for its object to improve the construction of the tuyeres employed in the process of manufacturing bessemer steel, in order to render the same more durable in use and simple in construction than others heretofore made. The invention consists in forming the tuyere of a refractory material, such as Jersey clay or other fire-brick clay, combined with fine molding sand or loam, the various materials being intimately mixed and molded into shape with the necessary cylindrical or conical shaped blast-openings, and subsequently subjected to a baking process, until the tuyere presents a dark yellow color, which determines the completion of the baking operation.

A tuyere composed of the materials specified differs in many important respects from the tuyeres now in use, whether composed of fire-clay or of a carbonaceous material, for the latter are, in a comparatively short time, worn off or disintegrated, so far as the surface exposed to the metal is concerned, while in a tuyere constructed according to my invention the air, in its passage through the blast-holes, will tend to vitrify the surface with which it comes in contact, and also cause the top of the tuyere to become vitrified to such a depth that the molten metal cannot wash away or enlarge the blast-holes as in clay tuyeres.

As heretofore made, tuyeres would, at the best, last but from three to six heats or "blows," while, by actual practice, it has been found that tuyeres formed according to my invention can be used for as many as twenty-five to thirty-five heats or blows before being rendered useless. It has also been found that the original form or dimensions of the blast-holes are preserved to a great extent during a constant use of the tuyere, and therefore no apprehension need exist as to the wearing away or enlargement of the inner surface thereof, as in the old form of tuyeres.

The materials used in the formation of the tuyeres are combined in about the proportions of one-half loam or molders' sand and one-half of fire or other suitable clay, for it has been found that the vitrification and solidification of the materials occurs with greater certainty and dispatch when so combined.

The dark-yellow color of the tuyere is due to the fact that the component materials thereof, when subjected to heat, will be converted to the color stated, and serve to indicate when the tuyere has been subjected to the requisite degree of heat.

A tuyere manufactured in the manner described presents a glossy appearance and possesses a better finish than those heretofore made from carbon, old crucibles, clay, &c., being also decidedly superior in many respects to the latter.

I claim as my invention—

A tuyere for the manufacture of steel by the bessemer process, composed of fire-clay and loam or molders' sand, prepared substantially as described, for securing the vitrification of the tuyere, as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of November, 1873.

JAS. E. ATWOOD.

Witnesses:

JAMES L. NORRIS,

ALBERT H. NORRIS.