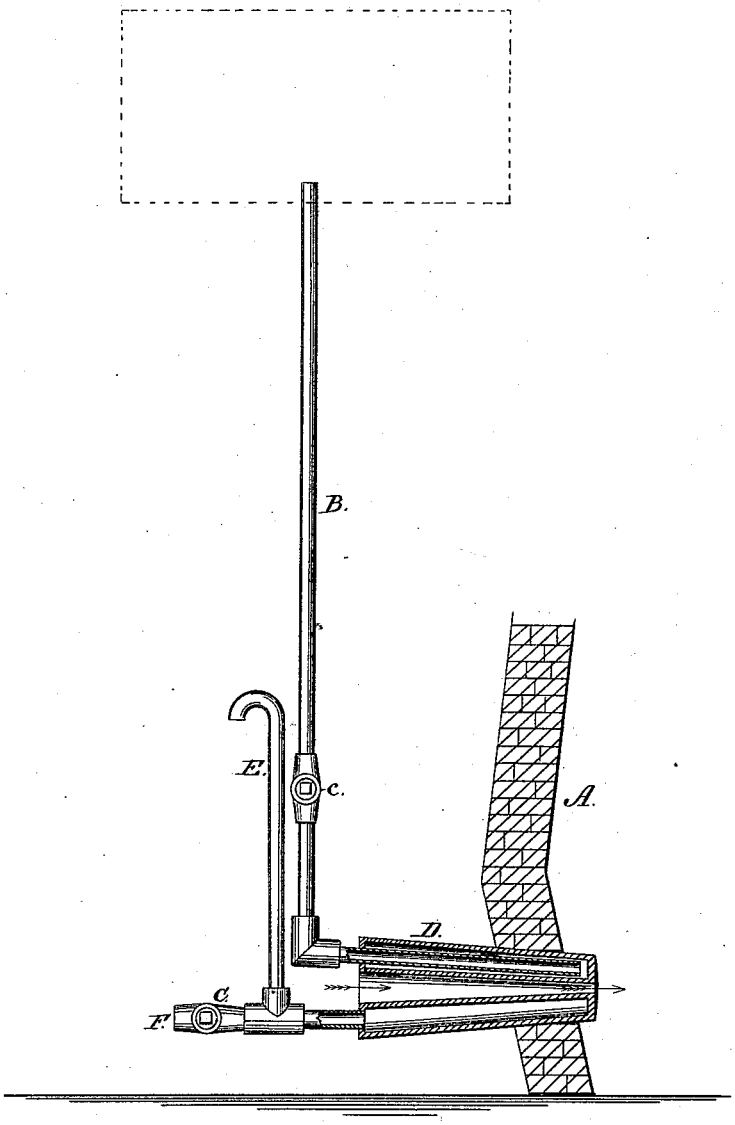
M. LESTER.

TUYERES.

No. 181,456. Patented Aug. 22, 1876.




WITNESSES:

W. W. Hollingsworth

Solon C. Kemon

INVENTOR:

Mark Lester

BY Munn & Co

ATTORNEYS.

# UNITED STATES PATENT OFFICE.

MARK LESTER, OF BELLAIRE, OHIO, ASSIGNOR TO HIMSELF, EDWARD JONES, AND WILLIAM M. READ, OF SAME PLACE.

## IMPROVEMENT IN TUYERES.

Specification forming part of Letters Patent No. **181,456**, dated August 22, 1876; application filed July 28, 1876.

*To all whom it may concern:*

Be it known that I, MARK LESTER, of Bellaire, in the county of Belmont and State of Ohio, have invented a new and Improved Tuyere; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification.

The object of my invention is to prevent the accumulation of sediment in the annular water-space of a tuyere for blast-furnaces, and to prolong the life and utility of the latter. To this end my invention consists in providing the overflow-pipe of the tuyere with an outlet-cock, located near the bottom of the water-space, through which the mud and sediment may be washed out, and extending the supply-pipe, which enters the tuyere at the top, to the nose or hottest part of the same, whereby the cold water is first brought in contact with the part of the tuyere which most needs the cooling effect, and whereby, also, the accumulated mud and sediment may be readily washed out by the natural passage of the water, as hereinafter more fully described.

In the accompanying drawing, A represents the side of a blast-furnace, through an orifice in which the tuyere D is fitted, for the purpose of conducting a blast of air to the interior. Said tuyere is constructed, as usual, in the form of a tapering tube with an annular space about the same, in which is kept up a circulation of cold water to obviate the damaging effects of the intense heat upon the material of which the tuyere is composed. As ordinarily employed, a supply-pipe, B, and a waste or overflow pipe, E, serve to effect the said circulation of water, the overflow-pipe being raised in order to keep the annular space always full of water. In the old way, moreover, the supply-pipe entered the tuyere at the bottom, while this overflow-pipe emerged from the top, both communicating directly with the large end of water-space.

This arrangement of pipes, it will be seen, together with the dormant or still condition of the water in the tuyere, which is the result of the pressure consequent upon the elevation of the overflow-pipe, resolves the water-space in the tuyere into a trap that catches and holds large accumulations of mud and sediment. The presence of this mud is extremely objectionable, in that an accumulation of the same in the water-space, and especially at the nose, will cause the tuyere to be damaged by the heat, while the mud also prevents the cooling effect of the water upon the nose, and the result is that steam is generated and the water forced back.

To obviate these objections, I have made three changes in the arrangement of the water-circulating devices: First, I connect the supply-pipe with the tuyere at the top and the overflow-pipe at the bottom; secondly, I extend the water-supply pipe B through the tuyere between the inner and outer shell of the same, to within an inch or so of the nose or hottest part of the tuyere; and, thirdly, I provide the overflow-pipe with a "blow-off" outlet, F, and a cock, C, upon a level with the bottom part of the water-space.

By this arrangement I am enabled to secure the advantage of introducing the cold water directly at the nose of the tuyere, where its cooling effect is most needed, while the same arrangement prevents the accumulation of sediment at the nose, and compels it to occupy a position near the larger end of the tuyere, from which it can be readily washed out. This is effected by opening the supply-pipe cock *c* to its fullest extent, thereby admitting the full volume of water, and then opening the blow-off cock C, which relieves the pressure in the tuyere caused by the elevation of overflow-pipe, and allows the water to operate with a full head from the supply-tank, to quickly wash out all mud and sediment, after which the cock C is closed, and the upper cock *c* regulated to the usual supply, until it becomes necessary to repeat the operation.

To enable the operative to ascertain definitely after such operation whether the nose

of the tuyere is perfectly clean, a rod may be inserted at the cock C to determine this question.

Having thus described my invention, what I claim as new is—

The tuyere having an annular water-space, in combination with a supply-pipe entering the same at the top, and extending to the nose of the same, as described, and an overflow-pipe communicating with said water-space at the bottom, and having a blow-off cock and outlet upon a level with the said bottom of the water-space, as and for the purpose described.

MARK LESTER.

Witnesses:
CHAS. C. CRATTY,
J. A. GALLAHER.