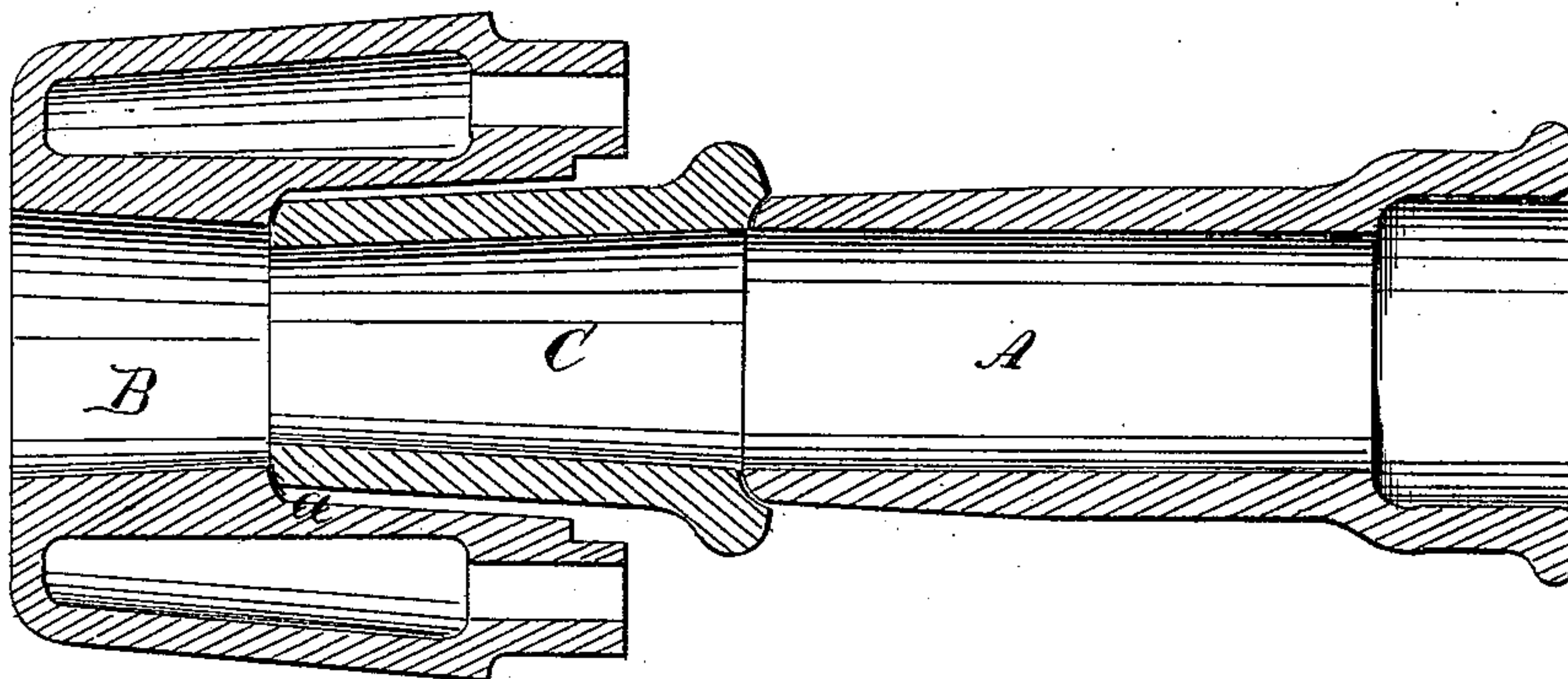


T. F. WITHERBEE.  
Tuyere.

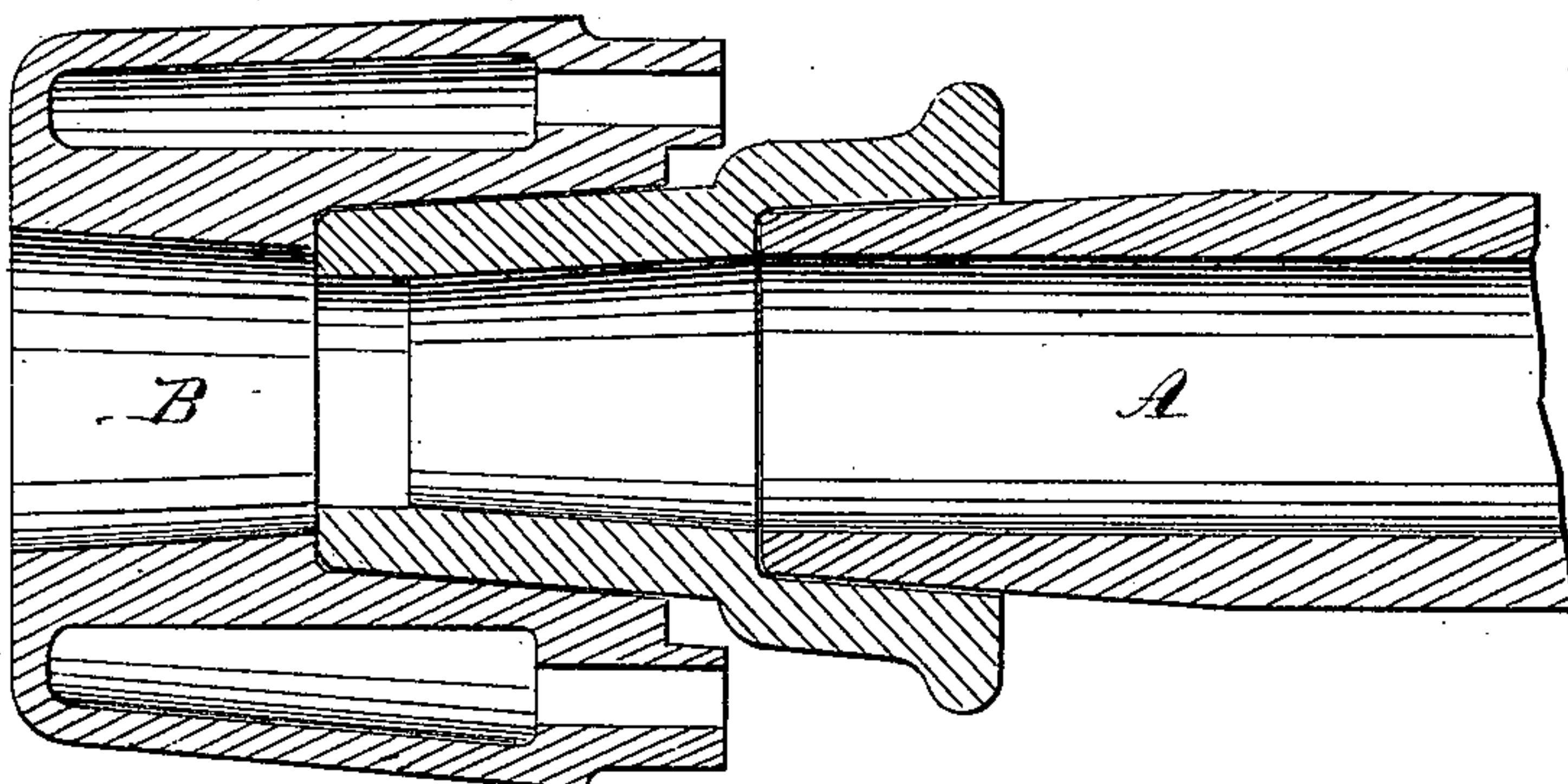
No. 199,134.

Patented Jan. 8, 1878.

*Fig: 1.*



*Fig: 2.*



WITNESSES:

*Chas. Nida.*  
*J. H. Scarborough.*

INVENTOR:

*T. F. Witherbee.*

BY

*Mumford*

ATTORNEYS.

# UNITED STATES PATENT OFFICE.

THOMAS F. WITHERBEE, OF PORT HENRY, NEW YORK.

## IMPROVEMENT IN TUYERES.

Specification forming part of Letters Patent No. **199,134**, dated January 8, 1878; application filed September 29, 1877.

*To all whom it may concern:*

Be it known that I, THOMAS F. WITHERBEE, of Port Henry, in the county of Essex and State of New York, have invented a new and Improved Tuyere and Blast-Nozzle, of which the following is a specification:

Figure 1 is a longitudinal section of my improved tuyere. Fig. 2 is a modification of the same.

Similar letters of reference indicate corresponding parts.

My invention consists in the combination, with a tuyere having a socket with a spherical joint at bottom thereof, and a blast-pipe, of a short nose-piece having a socket or a spherical joint for the blast-pipe, and used for lengthening the blast-pipe, or changing the size of the nozzle without sacrificing the main part of the blast-pipe.

In the drawing, A is a blast-nozzle having the usual form, except at its smaller end, which is made spherical to conform to the spherical cavity formed in the socket *a* in the tuyere B, and also to fit the spherical socket formed in the end of the auxiliary nozzle or reducer C. The reducer C is of the same internal diameter at its outer or larger end as the small end of the nozzle, and its internal diameter at the end which adjoins the tuyere is smaller than that of the tuyere or nozzle, so that the blast is concentrated by it, and is thereby rendered more suitable for "blowing in."

The reducing-nozzle is used only for this purpose, and when the furnace is started the blast-nozzle is drawn back a short distance, when the reducer is removed and the end of the blast-nozzle is inserted in the tuyere.

The spherical joint obviates the necessity of the careful adjustment of the nozzle or reducer. The reducer may have a socket formed in its larger end to receive the end of the blast-nozzle, as shown in Fig. 2, and its smaller end may be fitted to the socket in the tuyere, to which the end of the blast-nozzle may also be fitted.

By making one end of the reducer for a socket-connection, and the other for a spherical joint, the reducer may be conveniently used

to reverse the connection between tuyeres and nozzle. For instance, should a socket-tuyere be in use, by putting in a reducer it could be adapted to a spherical joint at the larger end where connecting onto nozzle.

I choose to use a socket or spherical joint in the nose-piece or reducer, for the reason that they can be made tighter than a sliding joint, as with the high temperature of blast now used a joint that will slide must be made very loose, otherwise the parts will soon adhere and become practically one piece, and thus defeat the object intended.

The advantage derived by locating a spherical joint at the bottom of the tuyere-socket is as follows: The thickening up at the inner end of the tuyere, made necessary to form the spherical joint, strengthens the tuyere where most liable to destruction from the cleaning-tools. Now, if the joint were made at the outer end of the tuyere it would, for the above reason, necessitate the thickening up of the inner part of the tuyere for its entire length, which would unnecessarily add to the cost of the same. Also, by locating the spherical joint midway or thereabout of the tuyere, as shown, the nozzle does not touch the tuyere, except at the joint. Consequently the blast is not cooled by the water in the tuyere to so great an extent as it would be if it were in contact the whole depth of the socket, and the blast is only in contact with the cold tuyere from the end of the nozzle to the end of the tuyere, and in that way escapes in a degree the cooling effect.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The tuyere B, having a socket, *a*, with a spherical joint at the bottom thereof, in combination with the short nose-piece or reducer C and the blast-pipe A, either or both having a corresponding end joint, as and for the purpose set forth.

THOMAS FRANCIS WITHERBEE.

Witnesses:

REUBEN WHALLON,  
F. A. PRICE.