J. WELLER.

Tuyere.

No. 55,186. Patented May 29, 1866.

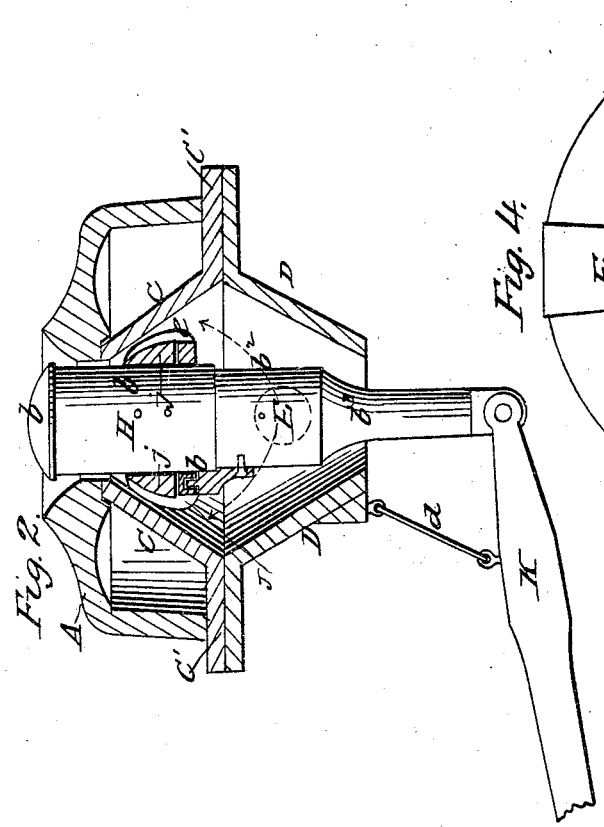

Fig. 2.

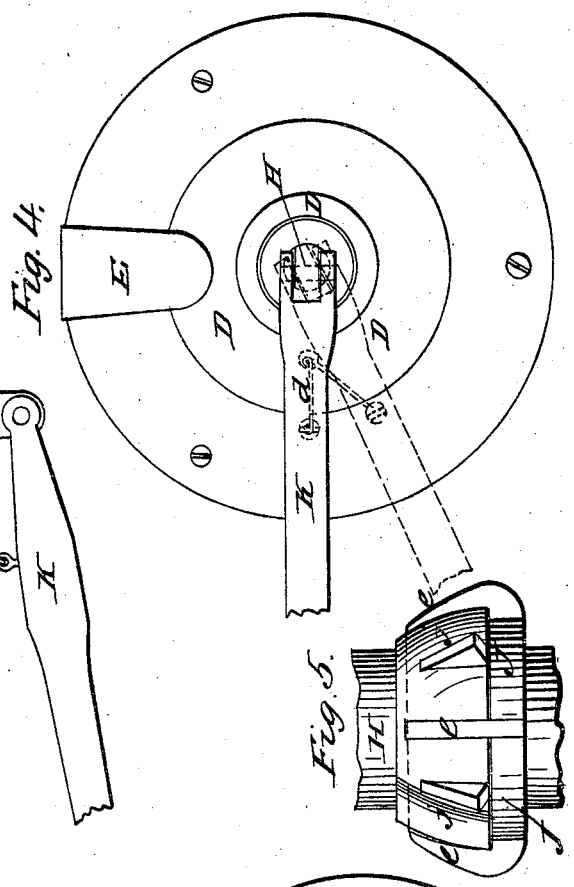

Fig. 4.

Fig. 5.

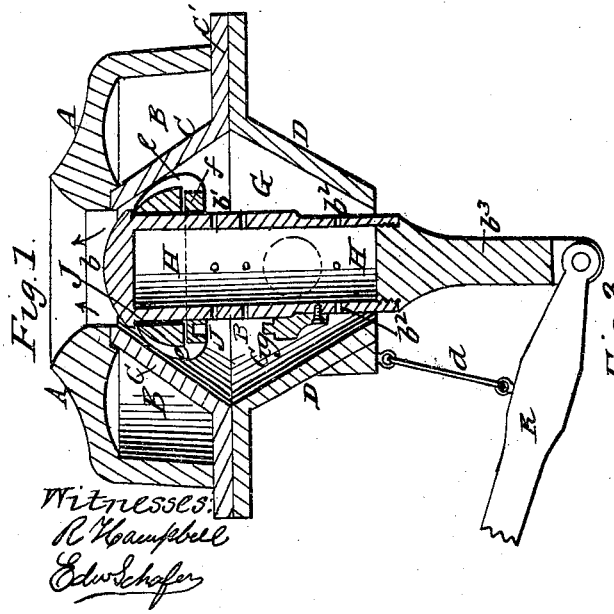

Fig. 1.

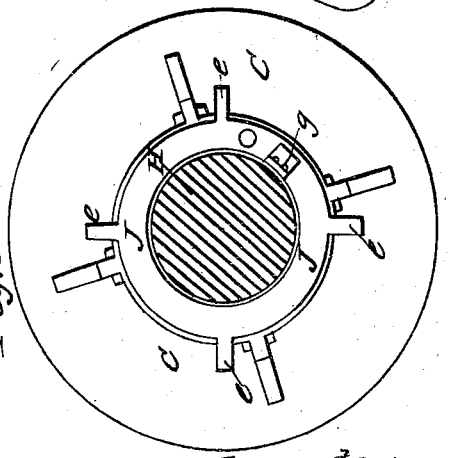

Fig. 3.

Witnesses:
R. Campbell
Edw. Schafer

Inventor:
Joseph Weller
by atty
Mason Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

JOSEPH WELLER, OF WASHINGTON COURT-HOUSE, OHIO.

IMPROVEMENT IN TUYERES.

Specification forming part of Letters Patent No. **55,186**, dated May 29, 1866.

To all whom it may concern:

Be it known that I, JOSEPH WELLER, of Washington Court-House, in the county of Fayette 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 thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a diametrical section through the improved tuyere, showing the throat-stopper depressed and the throat open. Fig. 2 is a similar view, showing the throat-stopper elevated and the throat closed. Fig. 3 is a bottom view of the tuyere. Fig. 4 is a sectional view, showing the bottom of the throat-clearer and stopper. Fig. 5 is a side view of the rotating throat-clearer.

Similar letters of reference indicate corresponding parts in the several figures.

My invention relates to an improvement on tuyeres which are adapted to receive water or air around the central blast-opening, for the purpose of preventing the body of the tuyere from becoming too hot or burning out rapidly.

The nature of my invention consists in so constructing a tuyere that the blast of air to the fuel of the furnace is divided around a plunger and passed up through a throat, which is surrounded by a water or air chamber, as will be hereinafter described.

It also consists in a novel mode of clearing the blast-hole or throat of the tuyere of cinders, and of discharging from the tuyere any fine cinders which may escape through its throat, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, A represents the top portion of the tuyere, or that portion which is exposed to the bed of coals in the furnace.

B is an annular chamber which surrounds the throat or central blast-hole, and which is adapted for containing water or air for cooling and keeping cool the top of the tuyere. When water is used as the cooling medium for the tuyere-chamber pipes are applied to it for the introduction and exit of the water. When air is used as the cooling medium, holes are made through the cone C, so that air can circulate freely in said chamber B.

The top A of the tuyere is suitably secured to the horizontal circular flange C′ of the cone C, the upper end of which cone is fitted snugly into an annular recess which is formed in the bottom side of the top A, as shown in Figs. 1 and 2. The sides of the hollow cone C form the inner closing side of the annular chamber B, and the flange C′ the bottom of said chamber. The upper end of the cone C terminates at the cylindrical portion *a* of the throat of the tuyere, and the upper end of this portion *a* terminates in a flaring opening which allows of the diffusion of the air rising from the throat into the bed of coals in the furnace. The top of the tuyere is slightly crowning, except at its center, where the flaring depression above mentioned is formed.

The base of the tuyere consists of an inverted frustum of a cone, D, which is hollow, and constructed with a circular flange projecting from its base, which flange is bolted to the bottom of the flange C′ of the cone C, as shown in Figs. 1 and 2. These two hollow cones, when united together at their bases, as above stated, form a chamber, G, within which nothing can well lodge, as its sides are inclined both outward and inward.

The air is admitted into the chamber G through the blast-pipe E, (shown in Fig. 3,) and when the bottom of this chamber is closed the air rushes upward and escapes through the throat or central hole, which is surrounded by the annular cooling-chamber B, as indicated by the arrows in Figs. 1 and 2.

A central stem or plunger, H, having an enlarged convex head, *b*, is used as a means for opening or closing the throat of the tuyere, for loosening up the bed of coals above it, for admitting of the discharge of fine cinders from the chamber G, and also for oscillating a shaker or throat-clearer, J. The diameter of the convex head *b* is nearly equal to the diameter of the throat. The diameter of the stem portion *b′* is less than that of the throat, and the diameter of the portion b^2 of the stem is less than that of the portion *b′*. This portion b^2 is equal in diameter to the hole through the bottom of the cone D, and when the stem is in the position shown in Fig. 1 the bottom of chamber G is closed and the air all passes upward and escapes from the upper end of this chamber. The lower end of the cylindrical portion b^2 of the stem H terminates in a reduced

portion, b^3, and when the stem is elevated, as shown in Fig. 2, the bottom of the chamber G is opened, and any cinders which may have escaped through the blast-throat into said chamber G will fall out through said bottom opening. The stem or plunger H is moved up or down or oscillated at pleasure by means of a lever, K, which is pivoted to the stem and supported from the cone D by means of a link, *d*. (Shown in Figs. 1 and 2.)

The clearer J is a flat ring having curved wings *e e e* projecting from it and extending upward and over the curved surface of a conical ring, J′, as shown in the drawings. The conical ring J′ is secured within the throat of the tuyere, so as to leave a narrow space around it for the division or diffusion of the currents of air. The ring or clearer J is allowed to oscillate freely, so that the wings or clearers *e e* thereon will shake out or discharge anything which would choke the throat. This oscillation is imparted to the clearer by elevating the plunger H so as to cause the pin *g* on it to enter a recess in the ring J, and then vibrating lever K horizontally.

It will be seen that the bottom of the chamber G is open when the plunger H is in a position for oscillating the clearer. Consequently all the cinders which escape from the throat of the tuyere during said operation will fall out from the bottom of the chamber.

By causing the air to pass upward around the fixed conical ring J′, and thus to escape from an annular exit, it will have a better effect upon the fire than it would if allowed to escape in one volume.

The convex head *b* on the upper end of the plunger is made larger in diameter than the stem portion b', so as to serve as a kind of valve, and also to support the plunger upon the top of the ring portion J′, as shown in Fig. 1. By rounding the head *b*, as shown in Figs. 1 and 2, this head will allow the cinders to slide from it when raised and fall below it and pass off through the chamber G, as above stated.

The plunger H is also used for regulating the blast of air by raising or lowering it more or less, and thus regulating the size of the blast-opening. This plunger may be made hollow or solid, and depressions or grooves may be made in its side for facilitating the escape of cinders.

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

1. The construction of a tuyere of an annular chamber, B, surrounding a central throat which communicates with the double conical chamber G, substantially as described.

2. The construction of the plunger H with a head, *b*, cylindrical portions b' b^2, and a reduced stem, b^3, in combination with the chamber G, substantially as described.

3. The conical ring J′, applied within the throat of the tuyere, in combination with a contrivance for clearing the throat, substantially as described.

4. The oscillating ring J, provided with wings *e e*, in combination with the plunger H, substantially as described.

5. Providing for giving a vertical and also an oscillating movement to the solid or hollow plunger H by means of a lever, K, substantially as described.

JOSEPH WELLER.

Witnesses:
A. C. JOHNSON,
JOHN B. PRIDDY.