

(No Model.)

J. M. HARTMAN.
TUYERE.

No. 460,131.

Patented Sept. 29, 1891.

FIG. 1.

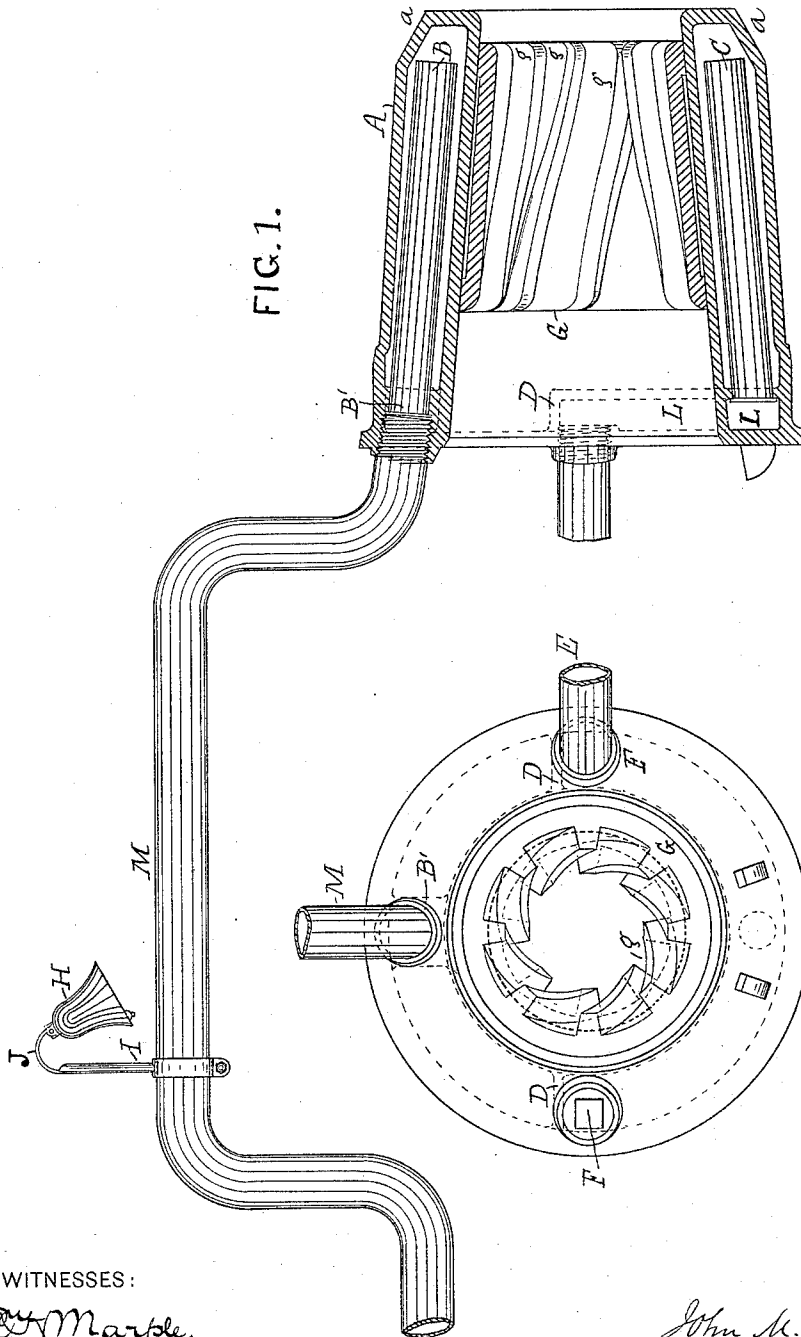
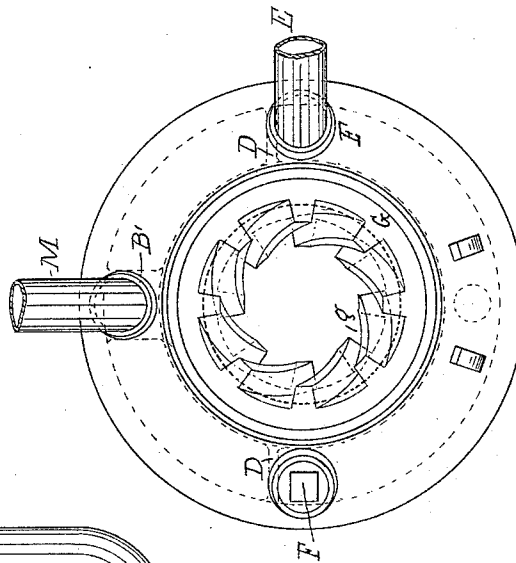


FIG. 2.



WITNESSES:

W. Marple.
Henry H. Paul Jr.

INVENTOR

John M. Hartman,
By Hollis P. Wiley
Attorneys,

UNITED STATES PATENT OFFICE.

JOHN M. HARTMAN, OF PHILADELPHIA, PENNSYLVANIA.

TUYERE.

SPECIFICATION forming part of Letters Patent No. 460,131, dated September 29, 1891.

Application filed December 31, 1885. Serial No. 187,204. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. HARTMAN, of Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Tuyeres, whereof the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a vertical section through the center of the tuyere, and Fig. 2 a view of the rear end thereof.

The objects of my invention are to facilitate the handling of the tuyere and to prolong its life by distributing the water circulation in the most efficient manner and by giving its exposed portions a configuration best adapted on the inside to insure contact with the water and on the outside to resist the destructive effect of contact with the molten iron, &c., within the furnace; also, to increase penetration of blast.

In said drawings, A represents the tuyere, which is in the form of a double or hollow shell, so as to leave space between for the circulation of water.

Within the rear end of the hollow shell is a channel L, which extends around from side to side, its extremities being indicated in Fig. 2 by the dotted lines D D. From this channel the pipe C leads at the bottom of the hollow tuyere, terminating at a very short distance from the nose end thereof. Water is admitted to the channel L by means of the pipe E, and thence flows into the pipe C, which delivers its stream directly against the bottom of the nose. This discharge-pipe B extends from near the nose to the butt, discharging its water at B' into the pipe M. The channel L extends around from side to side, or preferably a semi-circumference of the butt of the tuyere, so that the water-inlet pipe can be attached to either side thereof. As the water-supply does not always come on the same side of a tuyere, it has heretofore been customary to make tuyeres "right" and "left," and to keep a stock on hand adapted for either arrangement. By the use of this channel L, with attachments at either side, the tuyere can be adapted to any position of the water-inlet pipe without interference with the discharge-pipe, which should be of course at the top. Experience has shown that the points most liable to destruction are these top

and bottom portions of the nose end of the tuyere, and by this arrangement the coldest water is delivered directly against while a portion of the water circulates throughout the remainder of the shell.

By arranging the pipes at top and bottom of the hollow shell, one of which delivers while the other takes off the water, I obtain the active circulation desired of the two critical points, since whatever may be the activity of the circulation throughout the rest of the shell there must be a continuous and positive one at the points of entrance and exit of the water.

The discharge B is placed at top to carry off any air or steam that accumulates.

The bosses F F, placed on opposite sides of the butt, are to attach the supply-pipe to, only one side being used, while the other is plugged up, the object being to make tuyere connections either right or left hand and avoid a multiplicity of pipe connections with the tuyere.

To further protect the tuyere against the destructive effects of the molten contents of the furnace and to insure thorough cooling by the water, I construct the nose of the tuyere with a sharply-beveled periphery, as shown at a; said bevel being both upon the outside and inside of the shell. This construction has the double advantage of obviating a corner around the inside of the shell, within which the water circulation may become sluggish, and also presenting an inclined surface upon the outside, so that as the falling drops of melted iron within the furnace impinge upon the end of the nose they are deflected and much less liable to cut through the shell than where it terminates in a sharp edge or corner.

I mount upon a standard I, secured to the water-discharge pipe M or one of the other pipes leading directly from the tuyere, a bell H, suspended by a spring J. When the water circulation becomes defective or sluggish within the shell A, steam is formed with more or less rapidity therein, and the ebullition produces a jarring, sometimes of quite a violent character. This jarring is transmitted by means of the pipe M and standard I to the bell H, which oscillates upon its spring J, and thereby acts as an alarm to call the attention

of the furnace-men to the defective circulation.

The term "bell," as used herein, is synonymous with an alarm which is caused to shake
5 or rattle by the jarring of the steam within the tuyere, such jarring being communicated to the alarm by a direct-connecting pipe.

A detachable nose-piece G is fitted within the tuyere, metal to metal, but is constructed
10 with a number of spiral grooves along its inner face. The large hearths now commonly used require a high penetrating power in the blast, and the purpose of these grooves is to give the entering current a spiral or rotary
15 motion, which enables it to bore its way more readily into the fuel, &c., within the furnace and renders it less liable to be dispersed than a blast which has only a forward movement.

I am aware that it is not new to connect a
20 steam-whistle with the interior of a tuyere in such manner that the steam forced therein may be conducted to the whistle and sound it. I do not claim such a device, but only the use of an alarm to which the jarring of the
25 tuyere itself, by ebullition within, will be communicated by contact.

I am also aware that tuyeres have been used consisting of a group of pipes which communicate with annular channels at each
30 end, one of said channels forming a nose, the other the butt of a tuyere. My improvement differs from such device in that it enables me to utilize the preferred form of tuyere—viz., one constructed of a double shell instead of a
35 group of pipes with either right or left hand coupling connections—and still insures the efficiency of the water circulation within.

Long before sufficient steam will have been generated to efficiently operate the whistle injurious burning of the tuyere will have
40 taken place, whereas the jarring, which I rely upon to sound the alarm, occurs at the very commencement of ebullition, and thus gives immediate warning of the danger.

Having thus described my invention, I
45 claim—

1. The combination, with the tuyere having an interior annular water-space, of a bell mounted upon a part of the apparatus which is in contact with the tuyere and in commu-
50 nication with the water-space, whereby the vibration or jarring from incipient steam formation will be communicated to said bell, as and for the purposes set forth.

2. The double-shell tuyere having an inte-
55 rior continuous annular water-space from nose to butt, in combination with a single channel extending partially around its butt-end, said channel being provided with pipe attach-
60 ments and with a pipe leading from said channel to a point in close proximity to the bottom portion of the nose and with a discharge-pipe placed at or near the top of the tuyere and leading from a point also in close
65 proximity to the nose, whereby a rapid circulation is caused at the top and bottom of the tuyere, and whereby, also, the water-supply pipe can be attached either at the right or left hand of the butt thereof.

JOHN M. HARTMAN.

Witnesses:

C. H. MARPLE,
F. W. WEST.