

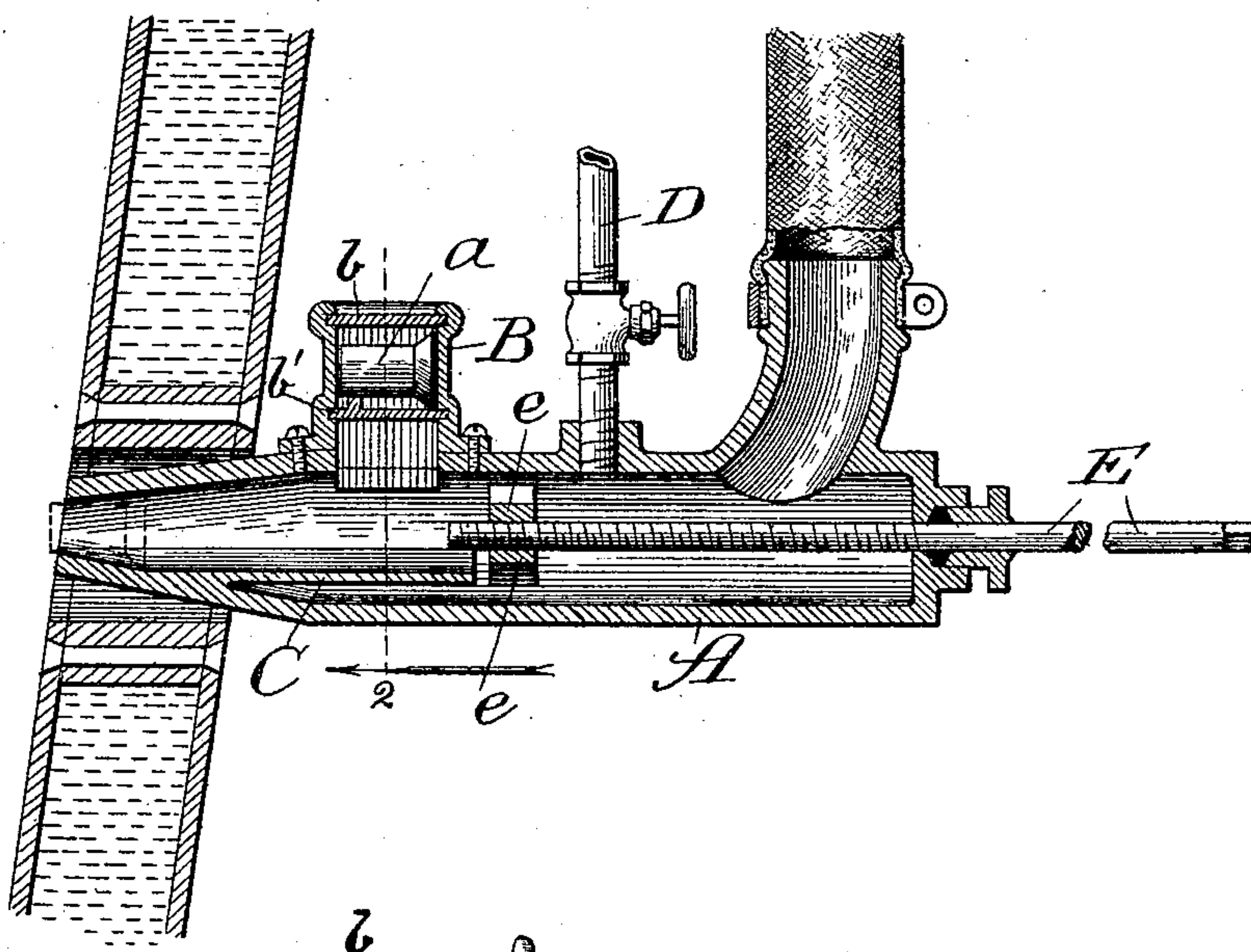
(No Model.)

C. M. ALLEN.  
TUYERE.

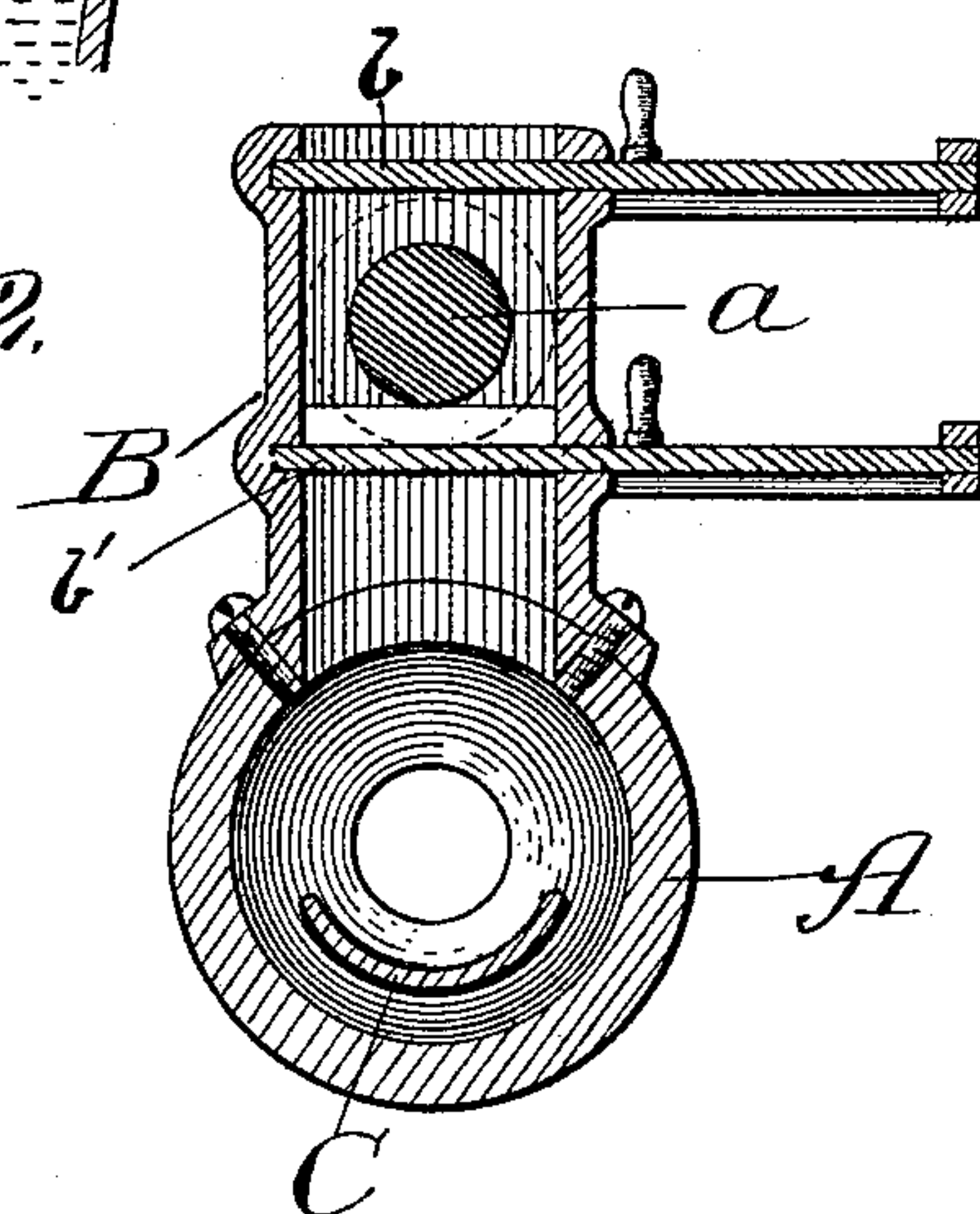
No. 496,034.

Patented Apr. 25, 1893.

*Fig. 1.*



*Fig. 2.*



Witnesses:  
*Chas. E. Gaylord,*  
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*Attys*



# UNITED STATES PATENT OFFICE.

CHARLES M. ALLEN, OF BUTTE, MONTANA, ASSIGNOR OF ONE-HALF TO  
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TRENT, OF SALT LAKE CITY, UTAH TERRITORY.

## TUYERE.

SPECIFICATION forming part of Letters Patent No. 496,034, dated April 25, 1893.

Application filed May 31, 1892. Serial No. 434,946. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES M. ALLEN, of Butte City, in the county of Silver Bow and State of Montana, have invented a new and  
5 useful Improvement in Tuyeres for Furnaces, of which the following is a specification.

The object of my invention is to provide for stopping the blast to permit separation of slag, matte and metal in the furnace; and the  
10 invention consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of my improved tuyere; and Fig. 2 a sectional view taken on  
15 line 2 of Fig. 1.

A is the shell of the tuyere, and *a* the plugs thereof; B a magazine for holding plugs in position to pass into the tuyere *b* the sliding top thereof and *b'* the sliding bottom thereof;  
20 C a trough or support for holding a plug in position to be blown or forced into the mouth of the tuyere; D a pipe for introducing gas or steam into the tuyere; and E a rod for forcing a plug through the tuyere to open the  
25 same, and *e* a support or bearing therefor.

Although my improvements are applicable to either a blast furnace or converter, I will, for convenience, describe them in connection with a converter. It will be understood, how-  
30 ever, that I use the term "converter" in a general sense, and as meaning either a blast furnace or converter, as circumstances may require.

As converters are now constructed, there is  
35 no way, except by tipping the converter, of stopping the blast and at the same time preventing the molten material from running into the tuyere. Owing to this, there is no way of shutting off the blast and stopping  
40 agitation, so as to permit slag, matte and metal to be separated in the furnace. The object of my invention is to obviate this difficulty, and provide convenient means for allowing separation in the furnace.

45 In constructing my improved tuyere, I provide for introducing plugs, preferably of the material reduced in the converter, to close the tuyere whenever it is desired to stop the blast. The plugs are introduced into the  
50 tuyere through a pipe connecting with a

magazine adapted to hold any number desired. As shown, this magazine is above the tuyere, and is provided with a sliding top and bottom—which I call valved openings—the top sliding only when it is desired to insert  
55 plugs, and the bottom only when it is desired to introduce one into the tuyere. As shown, the sliding top and bottom are metallic plates adapted to move back and forth in horizontal grooves in the walls of the magazine; but  
60 they may be made of other material and in other forms, the only essential in this respect being that they be capable of properly admitting the plugs into the magazine and allowing them to drop therefrom as desired. 65  
The magazine being filled with plugs, when it is desired to introduce one into the tuyere, the sliding bottom is drawn back to permit one of the plugs to drop down, the others being held in position in any convenient way. 70  
When the sliding bottom is opened, the lowest plug drops on to a suitable support or trough in a pipe connected with the tuyere, and in such position that it is immediately forced forward by the blast into the opening  
75 of the tuyere, the plug having an enlargement on its outer end to prevent its being blown through the tuyere into the converter. When forced into the opening of the tuyere  
80 by the blast, the plug immediately closes the tuyere, and thus shuts off the blast, and at the same time prevents the molten material from running into the tuyere. In order to open the tuyere again, I provide for driving  
85 in or drawing out the plug by means of a rod or screw, or otherwise. The rod or screw, when one is used, may be made to hold the plug in place, so as to prevent its being forced out by internal pressure, whenever it is desired to stop or remove the force of the blast. 90  
Of course the portion of the rod or screw intended to pass through the opening of the tuyere should be so constructed that when driven in it will not in itself close the opening. In other words, it should be so con-  
95 structed as to permit the entrance of sufficient blast to keep the molten material from running into the tuyere.

In some cases it may be found advisable to introduce gas or steam along with the blast, 100



especially where sulphide ores are used. In the smelting of such ores, I contemplate dispensing largely with carbonaceous fuels, and so, if additional fuel is sometimes found necessary, I prefer to introduce sufficient gas or steam to answer the purpose. The introduction of steam is especially well calculated to prevent generation of noxious fumes or gases.

Although I prefer to make the plugs of the material intended to be reduced in the converter, still I contemplate forming them of metal or any other suitable material; and of course they should be of the size or shape necessary for the tuyere in which they are to be used. Although I have shown the magazine for holding the plugs in a position higher than the tuyere, so as to permit the plugs to drop down, I also contemplate placing it in any convenient position—in some cases, it may be found advisable to place it at the side or below the tuyere, proper means being employed to force the plug into position in the tuyere. I also contemplate using other means than a rod or screw for forcing in or drawing out the plug—as for instance an ordinary bar, or a bar and lever. In short, as the essence of my invention consists in providing for shutting off the blast and at the same time preventing molten material from running into the tuyere, I do not intend to limit my-

self to minor features or details of construction. On the contrary, I intend to vary form or construction of any or all the parts, as circumstances may suggest or render expedient.

I claim—

1. A tuyere for converters or blast furnaces provided with a magazine for holding plugs, and a trough or support for guiding plugs into the opening of the tuyere, substantially as described.

2. A tuyere for converters or blast furnaces provided with a magazine for holding plugs, a trough or support for guiding plugs into the opening of the tuyere, and means for holding the plug in the opening the magazine being provided with valved openings, substantially as described.

3. A tuyere for converters or blast furnaces provided with a magazine for holding plugs, a trough or support below the magazine for guiding plugs into the opening in the tuyere, and a rod for holding the plug in the opening and driving it into the converter the magazine being provided with valved openings, substantially as described.

CHARLES M. ALLEN.

Witnesses:

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