(No Model.)

W. H. H. SHEETS.

TUYERE.

No. 265,156. Patented Sept. 26, 1882.

Fig. 1

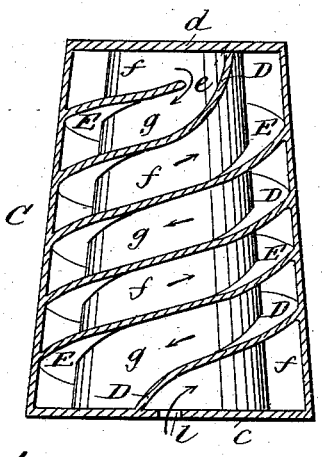


Fig. 3

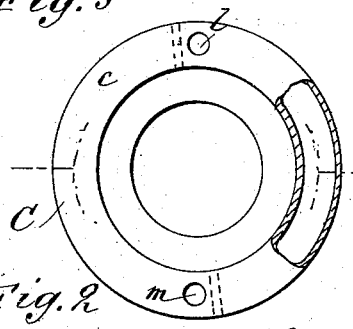


Fig. 2

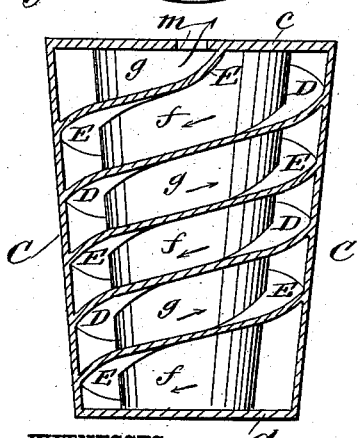
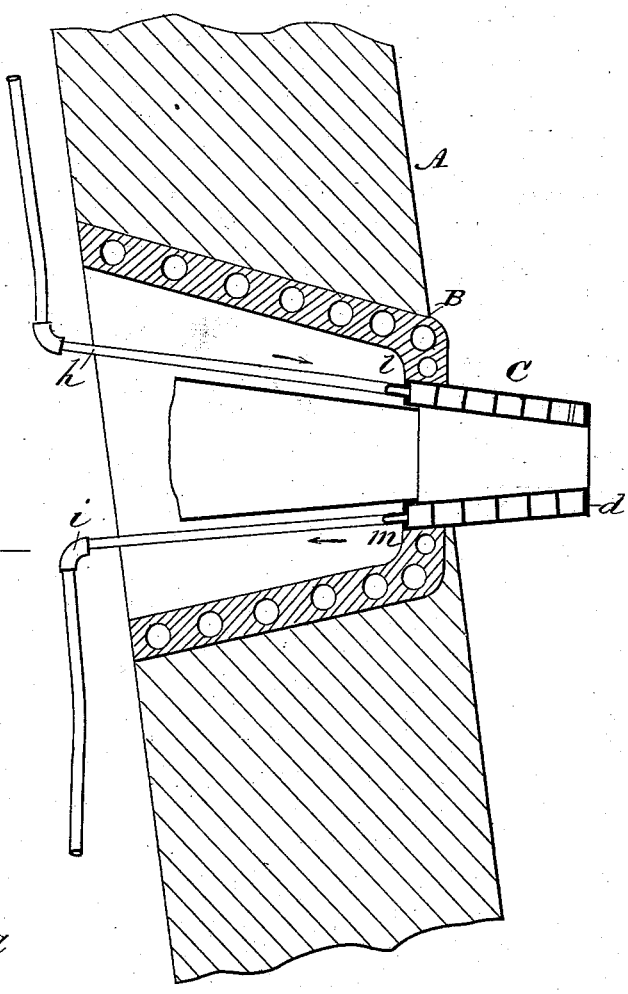


Fig. 4



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TUYERE.

SPECIFICATION forming part of Letters Patent No. 265,156, dated September 26, 1882.

Application filed April 17, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. H. SHEETS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Tuyeres for Blast-Furnaces, of which the following is a full, clear, and exact description.

The object of my invention is to prevent as far as possible the destruction of or injury to the tuyere by the heat of the furnace.

Heretofore it has been customary to place the tuyere in the arch, so that but a few inches of the nose was exposed to the heat; but the method most commonly adopted at the present day is to insert the tuyere in a breast or cooler in such a manner that all but a few inches of its entire length projects into the furnace, thereby exposing a much greater portion of the tuyere to the intense heat required to reduce the ores.

Tuyeres are commonly made of metals whose melting-point is below that of the ore, and consequently it is necessary to keep their temperature below the melting-point. Tuyeres are also liable to another destructive influence—namely, that of streams of molten metal falling from above and striking the tuyere on the upper side, producing the effect known among furnace-men as "drilling," which is caused by the melted metal burning or melting through the wall of the tuyere, forming small holes. To obviate these difficulties various methods have been adopted, such as providing the tuyere with double walls and introducing water therein, either directly or through coils of pipe, or by forming the tuyere itself of a coil of pipe.

My invention consists essentially in providing a doubled-walled tuyere with one or more double spiral channels or passages between the walls, said channels being formed by spiral partitions, commencing at the butt of the tuyere, diametrically opposite each other, and communicating with each other at the nose of the tuyere, through which channels a stream or body of water is kept in constant and rapid circulation from the butt to the nose, and then back to the butt and out through a waste-pipe, whereby the nose and entire body of the tuyere is kept at a comparatively low temperature, and the difficulties above referred to are obviated.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a view of my improved tuyere, with a portion of one side removed to show the interior. Fig. 2 is a similar view of the opposite side. Fig. 3 is a view of the butt, partly in section. Fig. 4 is a vertical sectional view, representing a portion of the wall of a furnace with my improved tuyere applied thereto.

A represents a portion of the wall of a blast-furnace, and B the tuyere breast or cooler, with my improved tuyere applied thereto in the usual manner. The tuyere C is composed of double walls, with the butt *c* and nose *d* closed. Between the inner and outer walls are two spiral partitions, D E. The partition D begins at the closed butt *c*, and, after winding spirally between the walls, terminates at the closed nose *d*. The partition E begins at the closed butt *c* diametrically opposite the point of beginning of the partition D, and, after winding spirally between the coils of the partition D, terminates at the point marked *e*, between said partition D and the closed nose *d*. By this means two spiral channels or passages, *f g*, are formed. The channel *f* begins at the butt, and at the point *e*, near the nose, it communicates with the channel *g*. At the butt-end of the channel *f* is an induction-port, *l*, to which is connected a supply-pipe, *h*, and diametrically opposite this port, at the butt-end of the channel *g*, is an eduction-port, *m*, to which is connected a waste-pipe, *i*.

The operation of my invention is as follows: Water from an elevated reservoir or other source passes into the tuyere through the supply-pipe *h*, and circulates constantly and rapidly from the butt to the nose through the channel *f* to the point *e*, where it passes into the channel *g*, and thence back to the butt, where it is conducted away by the pipe *i*. The course taken by the water is indicated by the several arrows in the drawings. The channels may be made to run in either direction—that is, either to the right or left—and may have any

desired number of turns, and the induction and eduction ports may be either one higher than the other or both in the same horizontal plane, as may be preferred, or as circumstances may permit or require.

The advantages of my invention are: By the constant and rapid circulation of the water through the tuyere from butt to nose and from nose to butt, not only the nose but the entire body of the tuyere is kept from overheating, as the heat communicated to the tuyere is absorbed by the water more uniformly and effectually than by any means heretofore known to me. By the contraction of the channels *f g* at the point *e*, where they communicate, the circulation is most rapid at the nose, where it is most needed. The burning or melting of the tuyere by the intense heat of the furnace is prevented, as is also the drilling action above referred to. By the rapid and constant circulation of the water the formation of steam in the tuyere is prevented, as is also the depositing of mud, grit, or other solid substance, which might be held in suspension in the water passing through the channels.

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

1. The double-walled tuyere with its nose and butt closed and provided in the intermediate space between its walls with spiral partitions secured directly to said walls, whereby greater surface of contact for the water passing through it is furnished, as shown and described.

2. The combination, with the double-walled tuyere C, butt *c*, and nose *d*, of the spiral partitions D E, arranged substantially as herein shown and described.

3. The combination, with the double-walled tuyere C, of the spiral channels *f g*, communicating with each other and extending from butt to nose and from nose to butt, the supply-pipe *h*, induction-port *l*, eduction-port *m*, and waste-pipe *i*, substantially as herein described.

WILLIAM H. H. SHEETS.

Witnesses:
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