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BLAST FURNACE TUYÈRE

Filed July 5, 1928

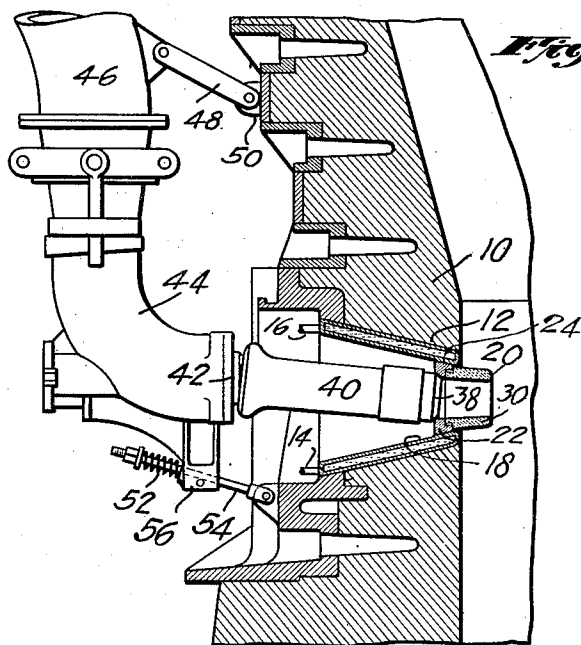


Fig. 1.

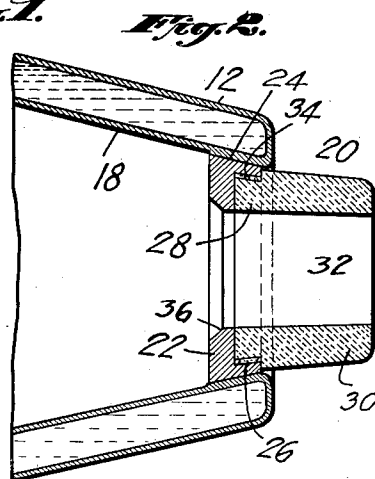


Fig. 2.

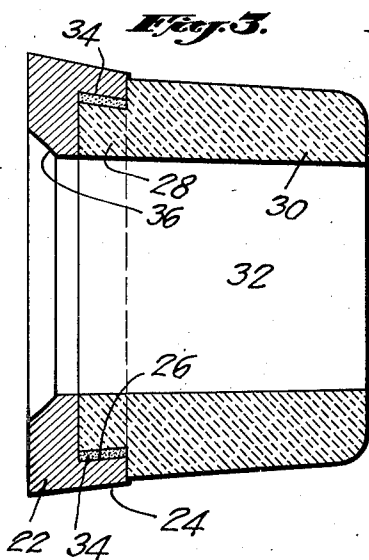


Fig. 3.

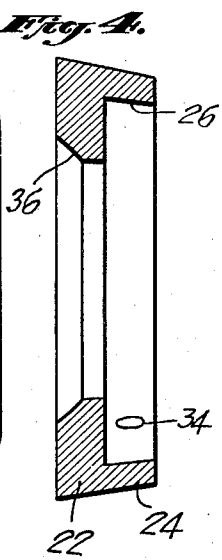


Fig. 4.

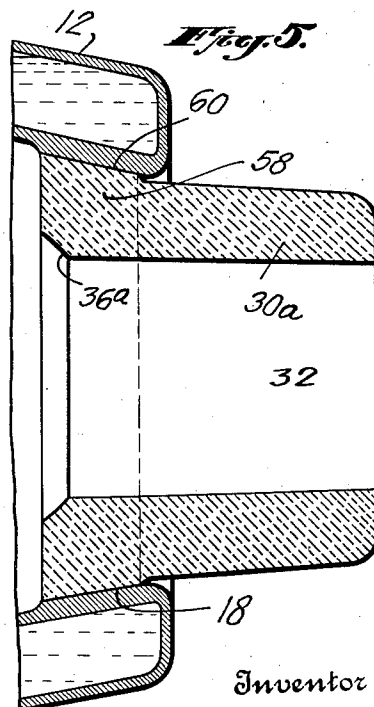


Fig. 5.

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BLAST FURNACE TUYÈRE

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This invention aims to provide an improved refractory tuyère having longer life than water-cooled tuyères heretofore used. The construction of my improved tuyère will be fully apparent from the following specification when read in connection with the accompanying drawings and the features of novelty will be defined with particularity in the appended claims. In the drawings—

Fig. 1 is a vertical sectional view through the bosh section of a blast furnace showing a typical form of tuyère cooler having my improved tuyère detachably held therein;

Fig. 2 is an enlarged detail showing a portion of the tuyère cooler with my improved tuyère fitted thereto;

Fig. 3 is an enlarged longitudinal section through a tuyère embodying my invention;

Fig. 4 is a detail longitudinal section of a supporting ring forming part of the tuyère;

Fig. 5 is a longitudinal section through a tuyère cooler having a modified form of my improved tuyère applied thereto.

In the drawings, 10 represents the bosh section of a blast furnace which is provided with a water-cooled tuyère cooler 12 having suitable inlet and outlet pipes 14 and 16 by means of which a circulation of cooling water is maintained. The cooler 12 is formed with a substantially frustoconical central chamber 18. My improved tuyère indicated as a whole at 20 is adapted to be detachably secured to the tuyère cooler 12. The tuyère is provided with a supporting ring 22, the outer surface 24 of which is tapered to correspond with the taper of the conical chamber 18 of the tuyère cooler. The ring 22 is undercut so as to provide a socket portion 26 which is adapted to receive the shank portion 28 of the tuyère body 30 which is preferably formed of carborundum or similar refractory material. The tuyère body 30 is of tubular form so as to provide a central blast opening 32.

The annular wall 26 of the supporting ring 22 is inclined inwardly and the shank portion 28 of the tuyère body is inclined outwardly so as to facilitate the keying or locking of the refractory tuyère body to the metallic supporting ring. In the embodiment

of the invention illustrated in Figs. 1 to 3 inclusive, the tuyère body is cemented or bonded to the supporting ring 22 by means of a body of high temperature cement indicated at 34. The outside diameter of the large end of the shank 28 is slightly less than the smaller diameter of the socket 36 so that the parts can be readily assembled. In assembling, the cement is applied to the annular wall of the socket 26 and the tuyère body is then pressed into position.

If desired, openings may be provided in the supporting ring as indicated at 34 in Fig. 4 so as to permit introduction of cement therethrough and provide an interlocking of the body of cement with the ring.

The ring 22 is provided with a seat or depression 36 shaped to fit the extremity 38 of a blow pipe 40 which in turn engages a spigot portion 42 of an elbow fitting 44 forming part of the blow stock indicated at 46. The member 46 is connected by a link 48 to the bracket 50 mounted on the furnace structure. The fitting 42 is yieldingly held against the blow pipe 40 by means of a compression spring 52 surrounding a pivoted link 54, said spring bearing against an extension 56 formed on the elbow 44. As thus arranged, it is clear that blow pipe 40 serves to hold the tuyère supporting ring 22 in engagement with the tapered annular wall of the tuyère cooler chamber 18.

In some instances, my improved tuyère may be formed entirely of carborundum or similar refractory material as indicated in Fig. 5 wherein the tuyère body 30* is provided with an integral heel portion 58, the outer surface 60 of which is of frustoconical form to fit the tapered opening in the end of the chamber 18 of the tuyère cooler. In this form of tuyère, the refractory body will be provided with a ground seat portion 36* for engagement with the end 38 of the blow pipe 40. Thus, it is clear that the tuyère may be made either of a single body of refractory material or it may include a supporting ring to which it is cemented or otherwise bonded. In either case, the tuyère can be detachably held in position in the tuyère cooler by engagement with the end of the blow pipe.

My improved tuyère possesses several advantages over the water-cooled tuyères now in common use. It has a longer life than such water-cooled tuyères and, therefore, reduces the cost of this item of blast furnace maintenance. Because of this long life, fewer tuyère changes are required than heretofore found necessary. This saves blast furnace shut-downs with the accompanying loss of tonnage. The new tuyère conserves heat due to the fact that no cooling water is circulated therethrough. Obviously, it also effects a saving of water over the water-cooled tuyères heretofore used.

When tuyère changes are necessary, this operation can be accomplished quicker with the refractory tuyère than with the water-cooled tuyère because of the lack of the necessity of making water connections. My invention also provides a tuyère which is not so liable to cause explosions such as frequently occur by the burning out of water-cooled tuyères. It, therefore, provides greater safety or security for workmen and cuts down the cost of blast furnace maintenance by saving the cost of making repairs incident to the explosions occasioned by the burning out of water-cooled tuyères.

While I have described quite specifically the details of the embodiment of the invention herein shown and described, it is to be understood that both the language and illustrations are to be interpreted in an illustrative rather than a limiting sense.

What I claim is:—

1. In combination with a blast furnace tuyère cooler having a tapered chamber extending longitudinally thereof, a tuyère of the character described comprising an annular body of refractory material extending beyond the end of the tuyère cooler and having an outwardly flared shank, a metal supporting ring having an inwardly flared socket in which said shank is secured, said supporting ring being tapered to fit the chamber of the tuyère cooler and removably engaging said tuyère cooler.

2. In combination with a blast furnace tuyère cooler, a tuyère comprising a solid metallic supporting ring fitted to the inner end of said tuyère cooler, said ring having a socket formed therein and an annular refractory tuyère body projecting beyond the end of said ring and extending beyond the end of said tuyère cooler and having a shank portion bonded within the socket of said ring.

3. A blast furnace tuyère comprising a metallic supporting ring of solid cross section having an undercut socket formed therein and an annular tuyère body of refractory material such as carborundum having a shank portion secured within said undercut socket.

In witness whereof, I have hereunto signed my name.

ROY H. LEDBETTER,