Feb. 18, 1930. W. A. HAVEN 1,747,712

TUYÈRE FOR METALLURGICAL BLAST FURNACES

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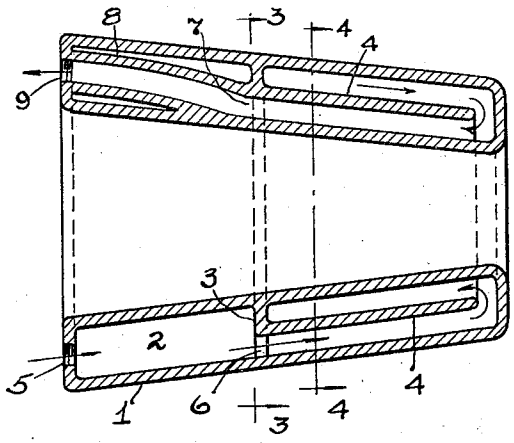



Fig. 1.

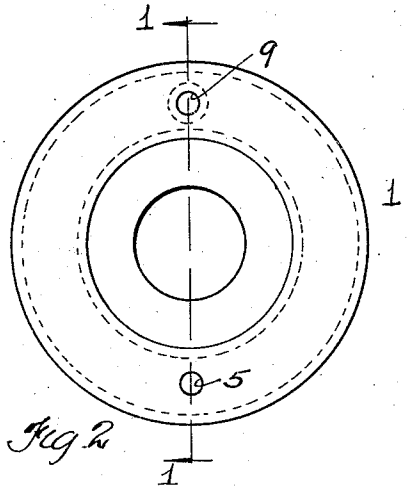



Fig 2.

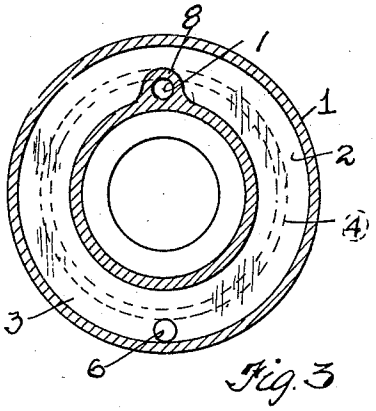



Fig. 3

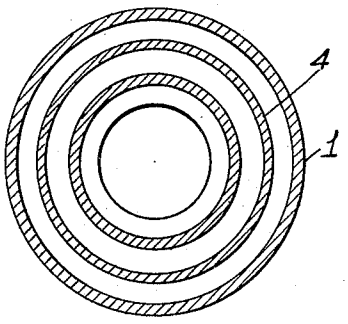



Fig. 4

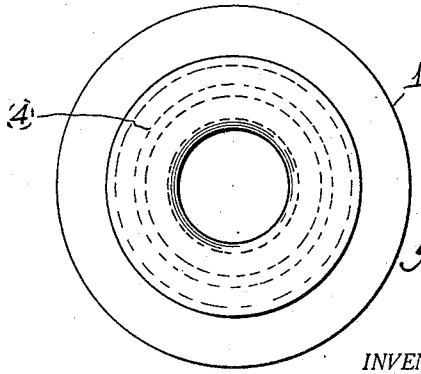



Fig. 5.

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# UNITED STATES PATENT OFFICE

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## TUYÈRE FOR METALLURGICAL BLAST FURNACES

Application filed March 6, 1925. Serial No. 13,475.

It has been customary to cast blast-furnace tuyères with the surrounding wall hollow so as to permit of the circulation through such wall of water or like cooling fluid. However, the inner end or nose of such tuyère and the adjacent outer portion of the wall are subjected to the highest temperature and considerable difficulty has been encountered in forcing the cooling fluid into the end which thus stands in greatest need of having its temperature reduced.

The object of the present invention, accordingly, is to provide the space within the hollow wall of a tuyère of the type in question with a partition or partitions that will serve to direct the cooling fluid in the most effective manner, viz, against the outer portion or wall of the nozzle adjacent the nose of the tuyère and into such nose itself. To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a central longitudinal section of a tuyère embodying my present improvements; Fig. 2 is an elevation of its outer end, as viewed from the left in Fig. 1; Figs. 3 and 4 are transverse sections taken on the planes indicated by the lines 3—3 and 4—4, respectively, Fig. 1; and Fig. 5 is an elevation of the inner end or nose of the tuyère, as viewed from the right in Fig. 1.

As shown in the figures, my improved tuyère is of the usual annular, somewhat frusto-conical form. Furthermore, the surrounding wall 1 that composes such tuyère is cored out so as to provide an interior hollow space 2, which is substantially co-extensive with such wall.

At a point intermediate of the ends of the tuyère, and preferably nearer the rear and larger end than the nose thereof, such space 2 is divided by a transverse partition 3 that extends circularly about the body of the tuyère and divides the space therein into two chambers. This transverse partition in turn carries a forwardly projecting shell 4 which lies between the inner and outer portions of the hollow wall 1 and is concentric therewith, such shell terminating short of the forward end of the tuyère body, as best shown in Fig. 1.

An inlet opening 5 is provided at a suitable point in the large end of the tuyère through which water or like cooling fluid may be supplied to the hollow interior 2, and the partition 3 is pierced at one or more points by an opening or openings 6 that lie between the outer portion of the wall 1 and said concentric partition or shell 4. Said partition is also pierced at another point with an opening 7 that lies between the inner portion of wall 1 and said concentric partition or shell 4, such opening 7 being connected by means of a duct 8 with a discharge opening 9 in the large end of the tuyère body. Where, as shown, a single opening 6 is provided, it will preferably lie diametrically opposite such opening 7.

As a result of the foregoing construction, the cooling fluid that is received through opening 5 in the hollow interior 2 of the tuyère wall is thence conducted into the annular space outside of the shell 4, through which space it is caused to flow in contact with the outer portion of the hollow wall 1 until it reaches the extreme inner end or nose of the tuyère. Such fluid then reverses its direction of flow and is conducted along the inner portion of such wall 1 to opening 7 whence it escapes by means of duct 8 and outlet opening 9.

If desired, the transverse partition 3 may be omitted and the concentric shell or partition 4 in that event be attached directly to the rear end of the tuyère body. In other words, the construction will be the same as though the portion of the tuyère, as shown in Fig. 1, were cut off immediately to the left of said partition, which will then become the rear end, while openings 6 and 7 will take the place of openings 5 and 9, respectively.

As a result of the foregoing construction,

the cold water, it will be seen, is carried through the nose of the tuyère along the side thereof most directly exposed to the heat of the furnace. At the same time a more rapid circulation of the water as well as a more uniform distribution thereof is secured. The tuyère will be cast from metal such as is regularly used in making these devices at present, it being understood that the hollow body with the partitions or baffles 3 and 4, as well as the duct 8, will be preferably, although not necessarily, cast as a unitary structure.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A tuyère comprising an approximately annular, hollow body, a transverse partition extending circularly about said body portion intermediately of the ends thereof and dividing the space therein into two chambers, a concentric annular shell extending from said partition into the forward chamber, and means for passing a cooling fluid through the chambers, said means including a connection opening to the rear chamber, an opening in the partition between the chambers on one side of the said annular shell, and a connection to the forward chamber independent of the rear chamber and located on the other side of the said annular shell.

2. A tuyère comprising an approximately annular, hollow body, a transverse partition extending circularly about said body portion intermediately of the ends thereof and dividing the space therein into two chambers, means for introducing a cooling fluid through the chambers, said means including a connection opening to the rear chamber, an opening in the partition between the chambers and a connection to the forward chamber independent of the rear chamber, and means in the forward chamber for diverting the fluid against one of the bounding walls before contact with the other wall.

3. A tuyère comprising an approximately annular, hollow body, a partition dividing said body into forward and rear compartments, a concentric shell between the inner and outer wall portions of said body and terminating short of the front end thereof, means for supplying a cooling fluid into the space between said shell and outer wall portion, said means including an opening in said partition, and means for withdrawing the fluid from the space between said shell and inner wall portion.

4. A tuyère comprising an approximately annular, hollow body, a transverse partition extending circularly about said body intermediately of the ends thereof and dividing the space therein into two chambers, a concentric shell extending forwardly from said partition between the inner and outer wall portions of said body and terminating short of the front end thereof, said partition being provided with an opening affording communication between the rear chamber and the space in the front chamber between said shell and outer wall portion and said body being provided at its rear end with exterior supply and discharge openings, and a duct connecting such discharge opening with the space in the front chamber lying between said shell and inner wall portion.

Signed by me this 2d day of March, 1925.

WILLIAM A. HAVEN.