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TUYERE WITH PREFORMED REFRACTORY NOSE AND SLEEVE

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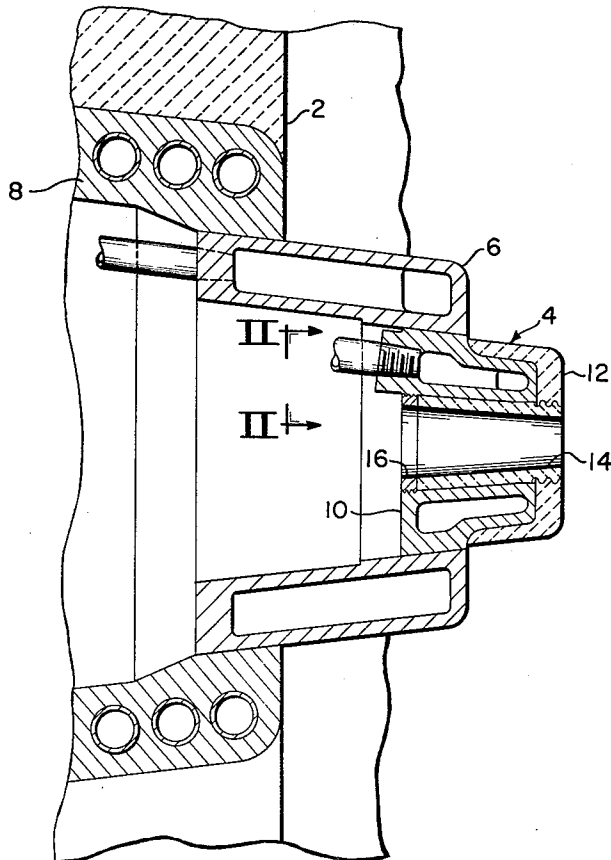


FIG. 1

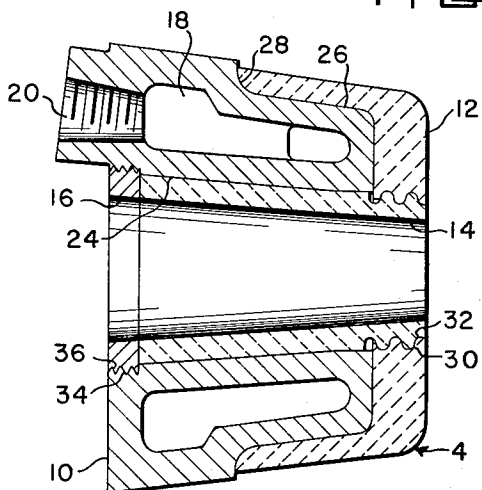


FIG. 3

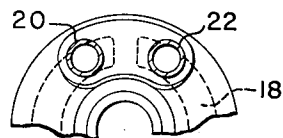


FIG. 2

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TUYERE WITH PREFORMED REFRACTORY NOSE AND SLEEVE

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This invention relates to an assembly for insertion in a blast furnace wall and more particularly to tuyeres and monkeys. These members are normally made of copper and are subjected to extremely severe operating conditions because of the high temperatures in the furnace, abrasion from the moving furnace burden, and splashes of molten pig iron from the burden falling into the furnace bosh. The cinder notch monkey may also fail if molten iron mixed with slag comes in contact with its outside surface, if the slag passing through the orifice or opening in the monkey contains molten iron which contacts the copper casting, or if an oxygen lance is required to burn through a plugged notch. Because of these conditions the tuyeres and monkeys have a relatively short life.

It is therefore an object of my invention to provide a blast furnace tuyere or monkey which has a longer than normal life.

Another object is to provide such a structure which is made of a plurality of parts.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

FIGURE 1 is a sectional view of a monkey in position in a blast furnace;

FIGURE 2 is a view taken on the line II—II of FIGURE 1; and

FIGURE 3 is an enlarged sectional view of the monkey of FIGURE 1.

Referring more particularly to the drawings the reference numeral 2 indicates the wall at the bottom of a blast furnace. A cinder notch monkey 4 constructed in accordance with my invention is supported by a cinder notch cooler 6, which in turn is supported by a cinder notch cooler 8. While my invention will be described in reference to a cinder notch monkey the same construction is used in a tuyere. However, the shape of the longitudinal opening through the tuyere and the shape of the tuyere nose may vary from that shown. The monkey or tuyere 4 consists of a body member 10, a nose 12, a sleeve 14 and a ring 16. The body member 10 and ring 16 are preferably made of copper or a copper alloy. The term "copper" as used in the claims is meant to include pure copper or an alloy which is predominantly copper, these materials being those most commonly used in tuyeres. The nose 12 and sleeve 14 are made of a refractory material which must resist fusing or softening at the operating temperature which is about 3000° F., crumbling, cracking, spalling and mechanical abrasion. It should also resist chemical reaction with molten blast furnace iron and slag and should have a low co-efficient of expansion and contraction. Graphite and other forms of carbon have proved suitable for this purpose. Refractory oxides such as alumina, chromite, dolomite, magnesite, silica and zirconia may also be used. High melting point metals or alloys thereof such as titanium, molybdenum, zirconium, tungsten and vanadium are also suitable. Silicon carbide bonded with silicon nitride in various proportions may also be used. The body member 10 is provided with the usual water cooling chamber 18 having inlet and outlet 20 and 22. A longitudinal opening 24 is provided in the body member 10. The opening 24 has a minimum diameter at the furnace end and a maximum diameter at the outer end. The body member

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10 has a reduced diameter portion 26 at its furnace end which provides a shoulder 28. The nose 12 fits over the reduced diameter portion 26 and bears against the shoulder 28. The furnace end of the nose 12 extends inwardly to the opening 24 and is provided with threads 30. The sleeve 14 fits within the opening 24 and is provided with threads 32 which mate with the threads 30. The threads 30 and 32 are preferably shallow threads, such as used in electric light bulbs, so as to provide a maximum thickness of the sleeve 14 at the threads.

In assembly, the sleeve 14 is inserted into the opening 24 and the nose 12 threaded thereon until the nose and sleeve are held firmly in place against the body member 10. The body member 10 is provided with threads 34 in the opening 24 at the end remote from the furnace. The ring 16 is provided with matching threads 36. The purpose of the ring 16 is to prevent the sleeve 14 from being pulled out of the body member 10 when the stop bott is removed from the monkey and to protect the monkey when the bott is being inserted. Thus the ring 16 acts as a further protective means to increase the life of the monkey. In case of breakage of the nose 12 or sleeve 14 the monkey or tuyere can be removed and the part replaced.

While one embodiment of my invention has been shown and described it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. An assembly for insertion in a blast furnace wall comprising a metallic body member having a longitudinal opening therethrough and a water cooling chamber surrounding said opening, a reduced outer diameter portion on the furnace end of said body member, a preformed refractory nose fitting over said reduced diameter portion and extending beyond the furnace end of said body member, and a preformed refractory sleeve fitting snugly within said longitudinal opening and extending into said nose, said nose and sleeve having matching threads thereon.

2. An assembly for insertion in a blast furnace wall comprising a metallic body member having a longitudinal opening therethrough and a water cooling chamber surrounding said opening, said opening having a maximum diameter at its outer end and a smaller diameter at its furnace end, a reduced outer diameter portion on the furnace end of said body member, a preformed refractory nose fitting over said reduced diameter portion and extending beyond the furnace end of said body member, and a preformed refractory sleeve fitting snugly within said longitudinal opening and extending into said nose, said nose and sleeve having matching threads thereon.

3. An assembly for insertion in a blast furnace wall comprising a copper body member having a longitudinal opening therethrough and a water cooling chamber surrounding said opening, said opening having a maximum diameter at its outer end and a smaller diameter at its furnace end, a reduced outer diameter portion on the furnace end of said body member, a preformed refractory nose fitting over said reduced diameter portion and extending beyond the furnace end of said body member, a preformed refractory sleeve fitting snugly within said longitudinal opening and extending into said nose, said nose and sleeve having matching threads thereon, a copper ring inserted within said longitudinal opening at its outer end and bearing against the end of said sleeve, and means fastening said ring to said body member.

4. An assembly for insertion in a blast furnace wall comprising a metallic body member having a longitudinal opening therethrough and a water cooling chamber surrounding said opening, a reduced outer diameter portion on the furnace end of said body member, a preformed

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refractory nose fitting over said reduced diameter portion and extending beyond the furnace end of said body member, a preformed refractory sleeve fitting snugly within said longitudinal opening, and means holding said nose and sleeve in intimate contact against said body member and in intimate contact with one another.

5. An assembly for insertion in a blast furnace wall comprising a copper body member having a longitudinal opening therethrough and a water cooling chamber surrounding said opening, said opening having a maximum diameter at its outer end and a smaller diameter at its furnace end, a reduced outer diameter portion on the furnace end of said body member, a preformed refractory nose fitting over said reduced diameter portion and extending beyond the furnace end of said body member, a preformed refractory sleeve fitting snugly within said longitudinal opening and extending into said nose, means holding said nose and sleeve in intimate contact against said body member and in intimate contact with one another, and means preventing outward movement of said sleeve.

6. An assembly for insertion in a blast furnace wall comprising a metallic body member having a longitudinal opening therethrough and a water cooling chamber surrounding said opening, said opening having a maximum diameter at its outer end and a smaller diameter at its

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furnace end, a reduced outer diameter portion on the furnace end of said body member, a preformed refractory nose fitting over said reduced diameter portion and extending beyond the furnace end of said body member, a preformed refractory sleeve fitting snugly within said longitudinal opening, means holding said nose and sleeve in intimate contact against said body member and in intimate contact with one another, a ring inserted within said longitudinal opening at its outer end and bearing against the end of said sleeve, and means fastening said ring to said body member.

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