July 10, 1962 W. C. COHN 3,043,578

ASSEMBLY FOR INSERTION IN A BLAST FURNACE WALL

Filed Sept. 22, 1959

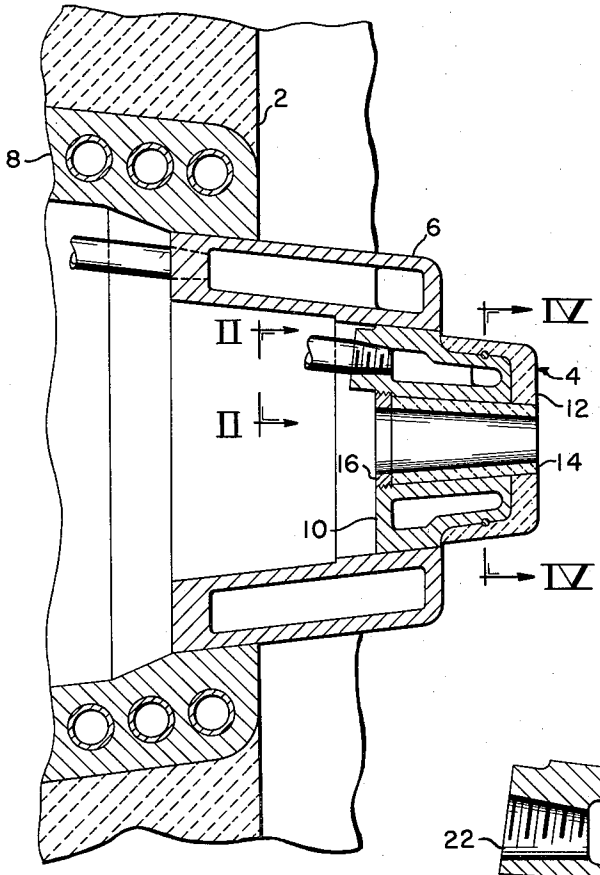


FIG. 1

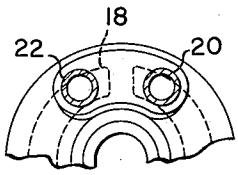


FIG. 2

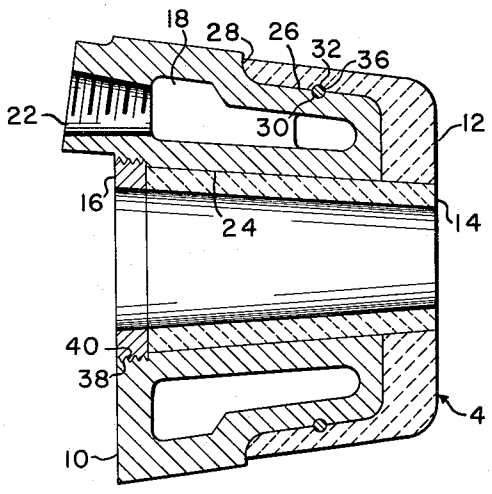


FIG. 3

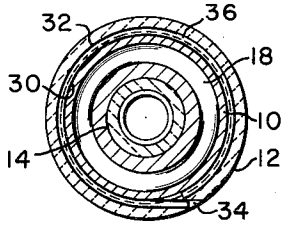


FIG. 4

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ASSEMBLY FOR INSERTION IN A BLAST FURNACE WALL

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1 Claim. (Cl. 266—41)

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 ssbjected to extremely severe operating conditions because of the high temperature in the furnace, abrasions 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. An assembly suitable for this purpose is shown in the co-pending application of Schultz entitled Assembly for Insertion in a Blast Furnace Wall, Serial No. 841,634, filed September 22, 1959. However, the means of holding certain of the parts together in that assembly has resulted in a plane of weakness under certain conditions. While the life of the tuyere and monkey of the Schultz application is greater than previous tuyeres and monkeys this plane of weakness somewhat shortens its life.

It is therefore an object of my invention to provide a blast furnace tuyere or monkey which has a longer than normal life and which has improved means for holding the parts together.

This 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;

FIGURE 3 is an enlarged sectional view of the monkey of FIGURE 1; and

FIGURE 4 is a view taken on the line IV—IV 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 monkey 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 claim 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 coefficient 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. 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 **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**. The body member **10** has a circumferential groove **30** on its reduced diameter portion **26**. The nose **12** has a circumferential groove **32** matching the groove **30** and a generally tangential opening **34** extending from the groove **32** to the outer surface of the nose.

In assembly, the sleeve **14** is inserted into the opening **24** and the nose **12** is placed over the reduced diameter portion **26** with its end abutting the shoulder **28**. A wire **36** is threaded through the opening **34** into the grooves **30** and **32** so as to lock the nose **12** to the body member **10**. Instead of using a formed wire, plastic material may be forced through the opening **34** into the grooves **30** and **32**. The material used must be of sufficient strength and have sufficient heat resistance to hold the parts together at the high temperatures encountered. The ring **16** is then positioned in the opening **24** at the end remote from the furnace. This may be done by welding, but is preferably done by providing matching threads **38** and **40** on the body member **10** and ring **16**. 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 claim.

I claim:

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 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 body member having a circumferential groove on said reduced diameter portion, said nose having a circumferential groove matching said groove on said reduced diameter portion and a generally tangential opening from its groove to its outer surface, a wire in said grooves separate from said copper body member and said refractory nose, and a copper bearing 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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