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T. SCHMIDT

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COOLED FURNACE TRANSPORT ROLLERS

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Fig. 1

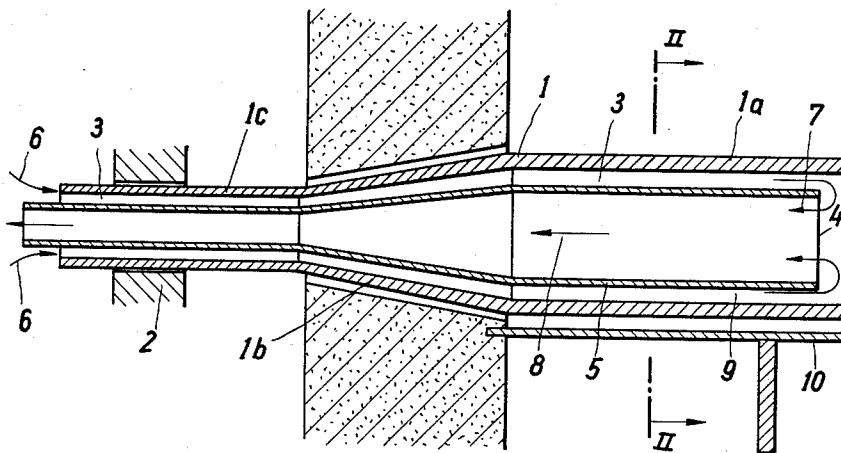
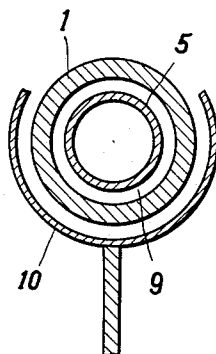


Fig. 2



Inventor:

THEODOR SCHMIDT

BY:

Karl F. Ross

AGENT.

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COOLED FURNACE TRANSPORT ROLLERS

Theodor Schmidt, Essen, Germany, assignor to Firma Indugas, Gesellschaft für Industrielle Gasverwendung m.b.H., Essen, Germany, a corporation of Germany

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2 Claims. (Cl. 263—6)

The present invention relates to cooled furnace transport rollers, and has for an object improvements therein.

Cooled furnace transport rollers, such as are used in industrial furnaces, are known in various forms of construction. In particular such rollers are known in which the actual roller body and the stub axles serving for mounting same are made hollow and are traversed by air or another gas as a cooling medium. This known construction suffers from certain disadvantages, since at least at one end the bearing is swept by the coolant heated in the roller by the desired cooling action, and thus becomes disadvantageously hot. It is true that the use of water for cooling hollow transport rollers of industrial furnaces has also been proposed, but at high temperatures of 800°, 900°, or even 1000° C., on account of the considerable formation of steam, such measures cannot be put into practice or can be applied only at great cost. In practice therefore the use of cooled furnace transport rollers is frequently dispensed with and at most the bearings are cooled, which in high-temperature furnaces are also exposed to considerable temperatures in consequence of the conduction of heat through the actual roller body to the stub axles of the mounting. These measures have however considerable disadvantages as their result. On the one hand the high temperatures entail considerable reductions of the strength properties and even bring about creeping of the materials of which the rollers are made, while on the other hand singular depositions occur locally on the roller body (pimpling), the formation of which has not actually been clearly explained, but in the production of which at high temperatures, of for example 900° C. and more, the fact that the temperature of the material being heated and the roller temperature practically coincide is undoubtedly of importance, since the process of pimpling is after all a welding operation which as is well-known is favorably influenced by equal temperatures of the bodies participating in the welding process.

In order to obviate the above-described disadvantages, it is a specific object of the invention to construct a cooled furnace transport roller in such a manner that the actual roller and the stub axles serving for mounting it are cooled simultaneously in a simple manner.

According to the invention there is provided a cooled furnace transport roller comprising a hollow roller body and stub axles adapted to be traversed by a cooling medium, in which a tubular conduit is inserted in at least one side of the hollow roller and stub axle, leaving a clearance around the inner body, this conduit being open approximately in the middle of the roller, whereby a cooling medium, for example air, may be introduced into this stub axle and into the clearance, and withdrawn through the conduit in counter-flow to the incoming stream of cooling medium. With the arrangement proposed according to the invention for cooled furnace transport rollers it is obviously possible, in principle, simply to introduce cooling air through the hollow stub axle at the other end of the roller in a manner known per se, while this cooling medium would then be withdrawn likewise through the aforementioned conduit provided only at one end, together with the cooling medium flowing around this conduit from the other side. However, a form of construction

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tion in which such conditions are provided on both roller sides in the manner described is more advantageous.

The conduits can be connected together centrally in the roller, while inlet apertures or outlet apertures for the cooling medium can be provided in the region of this center, for example in the form of an opening in the surface of the resulting tubular body. However, it is also possible to provide an annular gap between the two conduits, preferably in the region of the center of the roller, so that the two conduits do not form a continuous unit. The conduit can be held in the hollow roller or in the stub axle in any desired manner, advantageously with supporting means disposed between the conduit and the roller.

In the construction of furnace transport rollers according to the invention, the coolant can in principle be forced into the rollers through the above-mentioned gap, but it is also possible and more advantageous to aspirate the coolant, particularly air in this case, through the conduit. The withdrawal of the coolant from the conduit causes a reduced pressure within the furnace transport roller according to the invention, as compared with the furnace chamber, so that there is no danger, for example in the case of furnace chambers which are filled with a protective gas, that coolant, particularly air, might penetrate into the interior of a furnace. If an embodiment is selected in which the coolant is forced in under pressure, the advantage is gained that the fan or compressor can in this case work at room temperature.

The inserted conduit is advantageously so shaped that the transfer of heat from the roller surface to the medium flowing in the gap is considerable while the transfer of heat from the conduit to the interior thereof is small. Thus, for example, the conduit can be constructed of a material of poor thermal conductivity, but it is also possible to provide a simple sheet-metal insert. In addition it may be advantageous for the purpose of increasing the cooling action to reduce the amount of heat taken from the furnace chamber by the roller, for which purpose one or more screen plates can be provided which embrace part of the roller and thus reduce the radiation of heat from the furnace space to the roller.

The advantages achieved by the invention principally reside in the fact that with the furnace transport rollers according to the invention, where construction and shape are extremely simple, a simultaneous cooling of the actual roller body and of its mounting is achieved, so that there is no longer any prejudicial heating of the bearing through the withdrawal of cooling medium therethrough. By variation of the amount of aspirated air, the cooling effect can be continually varied, for example adjusted to a desired roller temperature. Through the provision of a cooled furnace roller according to the invention a roller temperature lying below the furnace-chamber temperature or below the temperature of the material being heated can easily be achieved. This not only means that the strength properties of the material of which the roller is made are improved, but it is also found that its tendency to receive depositions, particularly the so-called pimples, is reduced in a surprising manner if the roller temperature is below that of the material being heated. This effect is entirely surprising because it was thought hitherto that the formation of pimples could be reduced only if the temperature of the material being heated and of the roller, i.e. the furnace chamber temperature, is low.

The invention will be explained below in greater detail with reference to the accompanying drawing which merely illustrates by way of example one embodiment thereof, and in which:

FIGURE 1 shows the left-hand half of a furnace transport roller according to the invention in axial section; and

FIGURE 2 a section through the object illustrated in FIGURE 1, taken along the line II—II thereof.

The furnace transport roller illustrated in the drawing comprises a roller body 1 having a load-supporting part 1a intended for location in the interior of the furnace, and a conical intermediate member 1b situated in the brick-work, with the stub axle 1c connected thereto, said stub axle 1c being mounted in a bearing 2 as an outwardly projecting extremity of the roller. The stub axle 1c, the intermediate member 1b and the furnace part 1a can be welded together, and are made hollow throughout. On at least one side of the roller, in the embodiment illustrated on the left-hand side thereof, there is inserted in the hollow roller body 1, a tubular conduit 5 leaving a clearance 3 between it and the parts 1a, 1b and 1c. The conduit 5 is open at 4 approximately in the middle of the roller and is formed for example of sheet metal or of some material having poor thermal conductivity. The cooling medium, in the embodiment illustrated for example air, is introduced at the stub axle end into the clearance 3 formed therein, as indicated by the arrows 6, and is withdrawn through the conduit 5, as has been indicated at the end of the conduit by the looped arrows 7 and also by the straight arrows 8. Consequently a counter-flow is obtained between the cooling medium entering and the cooling medium passing out. At the other side (not shown) of the furnace transport roller 1 according to the invention, either the same arrangement is provided symmetrically, or it is also possible simply to introduce the cooling medium into the roller through the hollow stub axle and the load-supporting roller part in a manner known per se. As is apparent from the drawing, clearance 3 has a width which is small compared with the radius of the central roller portion 1a.

If two conduits 5 are provided that is to say if the illustrated construction of the furnace transport roller is supplemented by a similar, reversed arrangement on the other side in relation to the side shown in the drawing, the conduits 5 may be joined together at the center, but the surface of the conduit will have openings for the return of the cooling medium, or an annular gap 9 may be provided, as generally indicated, for the symmetrical extension of the arrangement shown in the FIGURE. In any case a feeding of the cooling medium by suction is advised although in principle it is also possible to force the coolant into the roller by pressure.

The conduit 5 is mounted and held in any desired manner in the roller body, and no details of this arrangement are illustrated or described, as it per se forms no part of the invention and will be apparent to those skilled in the art.

In order to reduce the radiation of heat from the furnace chamber to the roller 1, a screen plate 10 is provided which spacedly surrounds part of the roller 1.

I claim:

1. A furnace roller comprising a generally cylindrical tubular body having a central load-supporting portion, and two bearing extremities on opposite ends thereof, at least one cooling-fluid conduit extending into body at said one extremity thereof and opening into said body at substantially the center of said load-supporting portion while terminating at a lateral location substantially at the midpoint between the ends of the external periphery of said central load-supporting portion, said conduit being spaced with substantially all-around clearance from said body, said clearance communicating at said one extremity with a source of cooling fluid to be drawn from said source through said clearance into said load-supporting portion and ejected outwardly therefrom via said conduit, thereby cooling substantially half of said body, and an imperforate elongated heat shield substantially extending coaxially along said body and spacedly surrounding a lower part of said load-supporting portion.

2. A furnace roller comprising a generally cylindrical tubular body having a central load-supporting portion a pair of bearing extremities on opposite ends thereof, a pair of cooling fluid conduits respectively extending into said body at said extremities and opening into said body at substantially the center of said load-supporting portion while terminating at a lateral location substantially at the midpoint between the ends of the external periphery of said central load-supporting portion, said conduits being spaced with substantially all around clearance from said body, said clearance communicating at each of said extremities with a source of cooling fluid to be drawn from said source through said clearance into said load-supporting portion and ejected outwardly therefrom via said conduits, thereby cooling both halves of said body, and an imperforate elongated heat shield substantially extending coaxially along said body and spacedly surrounding a lower part of said load-supporting portion.

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