(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 019 077**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **80101839.1**

(51) Int. Cl.³: **F 27 D 3/12**

(22) Date of filing: **05.04.80**

(30) Priority: **13.04.79 IT 2894679 U**

(43) Date of publication of application:
26.11.80 Bulletin 80/24

(84) Designated Contracting States:
CH DE FR GB IT LI NL

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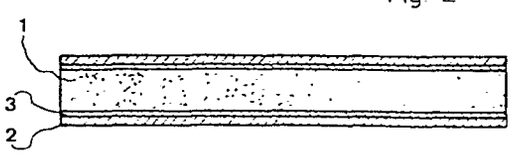
(54) **Roller for the conveyance of products in kilns, particularly in the ceramic tile industry.**

(57) A roller for the conveyance of products in kilns, particularly in ceramic tile industry comprises: an outer cover of metallic material with hollow round section (2), constituted by one or more than one sections, suitable to resist rapid temperature changes and to maintain its outer surface unaltered, and an internal core of ceramic material (1) resisant to temperature changes and to strains.

One or more than one layers of bonding elastic and/or incoherent material (3) are interposed between the outer cover and the core, in order to make the expansion of the cover and of the core independent one from the other.

Fig. 2



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Roller for the conveyance of products in kilns, particularly in the ceramic tile industry

The invention concerns a roller for the conveyance of products in kilns, particularly in the ceramic tile industry, that is to say a roller driven to rotate and destined to form together with other analogous rollers arranged side by side a belt for the conveyance of a product such as - to give a not limiting example - ceramic tiles along the kiln during their heat-treatment at high temperature.

The prior state of art comprises conveyor rollers in metallic as well as in ceramic material, heat resistant and therefore called "refractory": metallic rollers have a low strain resistance because of flexure at high temperatures, however they are resistant rapid temperature changes, not liable to tacking with the material of the products to be treated and capable of maintaining unaltered the state of their surfaces; ceramic rollers have a good resistance to flexure and strain, but not to rapid temperature changes and being liable to tack to materials with coefficients of expansion similar to their own so that their surfaces often are irregular because of the losing and/or gaining of particles, which change the dragging of the products, thus causing disorder and obstructions in the product flow with consequent damages to the production cycle.

This prior state of art is liable to improvements with regard to the opposite needs of having strain resistant rollers, which are at the same time capable of maintaining unaltered and clean their surfaces in order to obtain the correct conveyance of the material to be treated, to avoid snags to the production because of failures in the material flow, as well as the need of frequent replacements of the rollers.

From the afore-said derives the necessity of resolving the technical problem of finding a type of roller, which resists to strain and, at the same time, maintains his own surface clean and unaltered with any type of material to be treated and particularly in the case where the transported material consists of ceramic tiles or of ceramic or brick products

in general.

The invention resolves the above technical problem by adopting a roller formed by an outer covering of metallic material suitable to resist rapid temperature changes and to maintain its surface unaltered, and an internal core, of any shape whatsoever, of ceramic material resistant to the high temperatures of the kiln as well as to stress of flexure and strain in general of the core, due to the action of the weight of material to be transported and to its own weight at said high temperatures.

The advantages obtained by this invention are: absolute regularity of the conveyance of the material to be transported because of the unchangeability of the surface state of the metallic material; resistance of the whole of the components to flexure and strain in general at high temperature such as to allow the roller to maintain the straightness of its axis and the roundness of its sections.

Some embodiments of the invention are illustrated -just in order to give an example - in the two enclosed drawing tables, in which:

Figure 1 is the longitudinal section of a generic roller outwardly metallic and inwardly of ceramic material;

Figure 2 is the longitudinal section of a roller with an interposed sliding layer between the metal and the ceramic material;

Figure 3 is the longitudinal section of a roller like that of Figure 1 with a ceramic material core, which finishes near the two ends in order to allow the passage of the dragging pin during rotation;

Figures 4, 5, 6 are longitudinal sections of rollers, the covers or cores of which are formed by assembled sections;

Figures 8, 9, 10, 11, 12, 13, 14, and 15 are straight sections of rollers with covers and cores coupled in different ways.

The indications are as follows: 1 indicates the core of the roller in refractory ceramic material; 2 is the cover in refractory steel, which surrounds it; 3 indicates a layer of sliding material interposed between 1 and 2 and consisting

of a bonding elastic agent or of incoherent material or, in any case, of material with such an expansion coefficient as to make the expansion of the two elements independent one from the other; 4 indicates dragging notches made at the ends of the cover 2 and protruding compared to the end of the core 1; 5 is a tubular core in refractory ceramic material; 6 indicates a refractory metallic cover consisting of sections arranged side by side; 7 indicates a tubular core of refractory ceramic material in sections arranged side by side; 8 is a tubular core of refractory ceramic material composed by sections fitted one in the other; 9 and 10 are respectively a tubular refractory core with irregular outer surface and the corresponding refractory metallic cover obtained by fusion; 11 is a refractory ceramic core with star section; 12 indicates a refractory ceramic core with polygonal section; 13 is a refractory ceramic core composed by a pair of opposed cupels; 14 indicates a refractory ceramic core consisting of three tubular elements arranged at an angle of 120° among each other.

The working of the rollers takes place in the following manner: during the transport of the material to be heat-treated inside the kiln, the core 1 (or an other one) serves as a support insensitive to the stresses of flexure even at the highest temperatures, whilst the cover 2 (or an other one) maintains its cylindrical shape with rectilinear axis resists the changes of temperature and maintains its cylindrical surface unaltered, not having a task of support but in a minimum way and being moreover applied to a not yelding support, namely the core itself.

In the case of the roller of Figure 2 the occuring stresses owing to possible considerable differences of the coefficient of expansion between the core 1 and the cover 2 are neutralized by the interposed layer 3 of bonding elastic agent and/or incoherent material.

In the practical realization the materials, the details of execution and the ends of the roller suitable to connect with the supporting and dragging elements, may be different from those indicated, but must be technically equivalent with

out leaving the juridical dominion of this invention. Moreover, the shape of the outer surface of the cover 2 of the roller might be non-cylindrical considering the fact that the surface itself may have particular shapes suitable to avoid differences of the advancement of the various rows of parallel tiles. It is to be noted that the presence of the metallic cover 2 contributes to make the thermal shock within the core 1 less violent. Such a metallic cover may be of different thicknesses, varying from a few micron up to a centimeter and more, according to the requirements. Moreover, the layer 3 of Figure 2 might be formed by more than one layer.

CLAIMS

1. Roller for the conveyance of products in kilns, particularly in the ceramic tile industry, comprising a rotation axis and means of attachment at the end in order to confer a rotatory movement to it, characterized by the fact, that it consists of an outer cover in metallic material, with hollow round section, constituted by one or more than one sections, suitable to resist rapid temperature changes and to maintain its outer surface unaltered, this surface surrounding a core of any shape, made of ceramic material, resistant the high temperature of the kiln as well as to the stresses caused by the load to be conveyed and by the weight of the roller itself: the coupling between said cover and said core can be extended to the whole inner surface or limited to lines of the latter, and can be of the extractable or non extractable type.

2. Roller according to claim 1, characterized by the fact that between said cover and said core one or more than one layers of bonding elastic and/or incoherent material are interposed in order to make the cover and the core independent from the effects of the differences of their coefficients of expansion.

3. Roller according to claims 1 and 2, characterized by the fact that the length of the core is limited to the areas not involved in the passage of the dragging means in rotation.

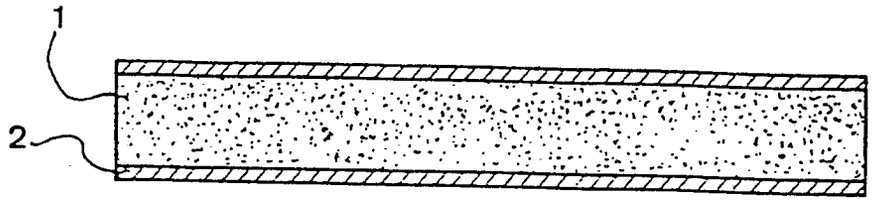

Fig. 1

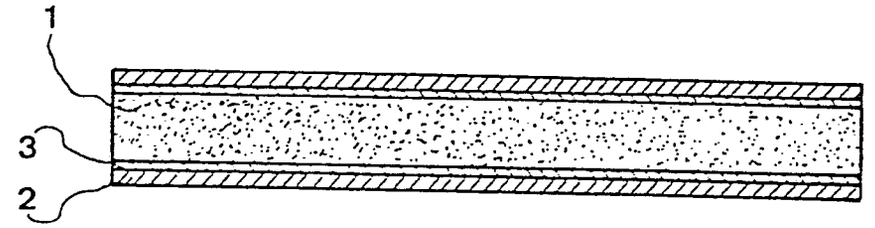

Fig. 2

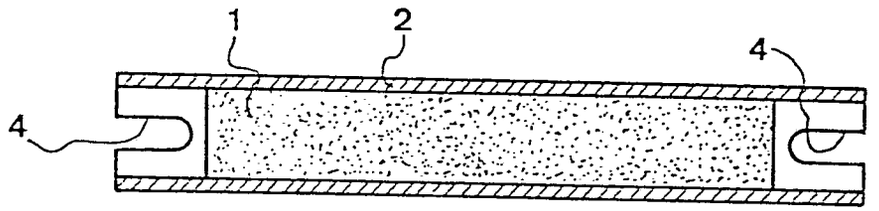

Fig. 3

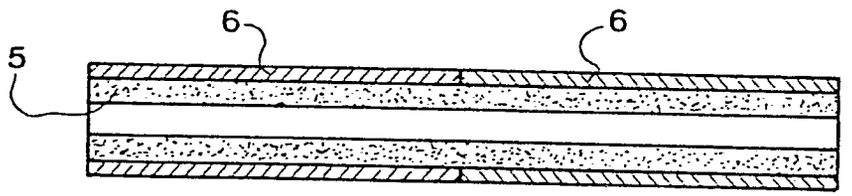

Fig. 4

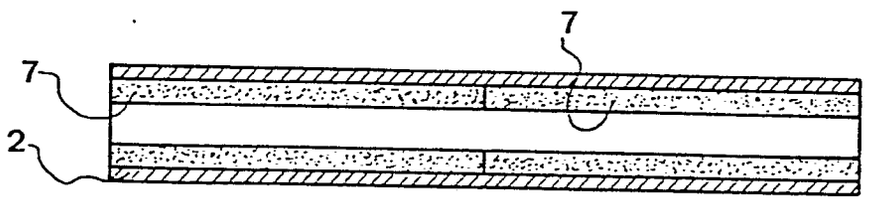

Fig. 5

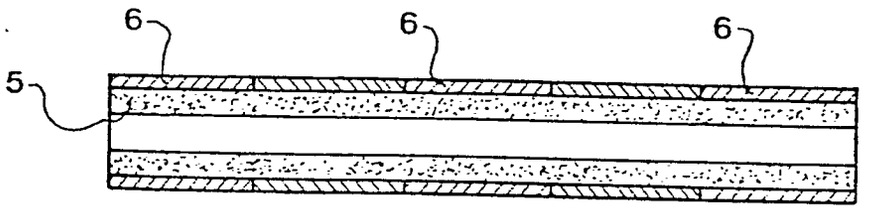

Fig. 6

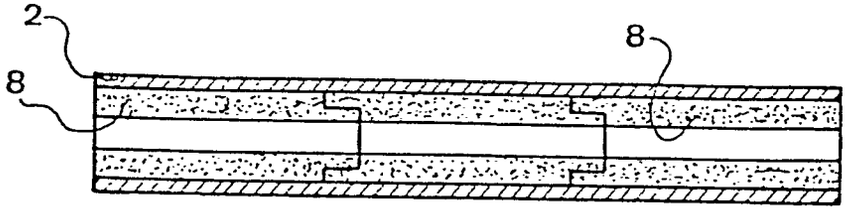

Fig. 7

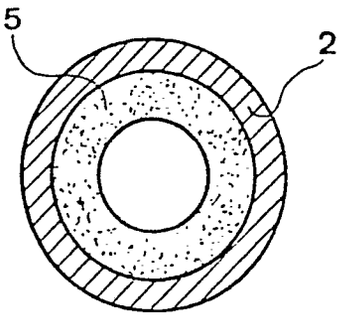

Fig. 8

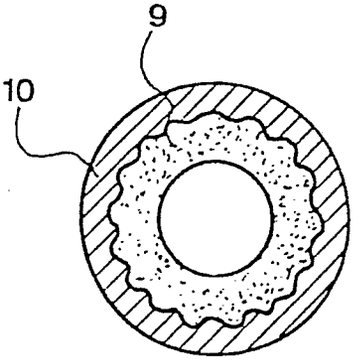

Fig. 9

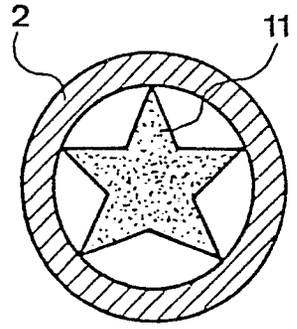

Fig. 10

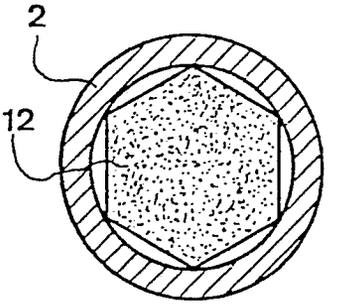

Fig. 11

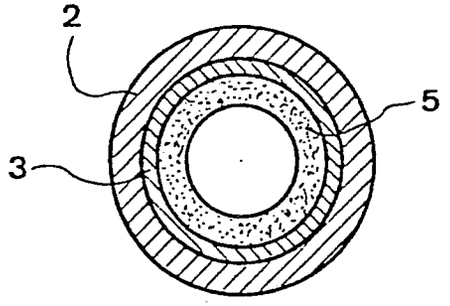

Fig. 12

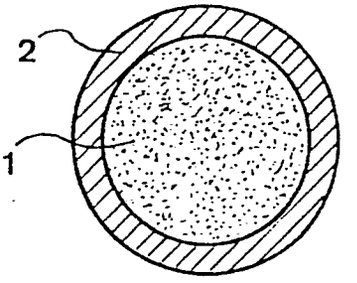

Fig. 13

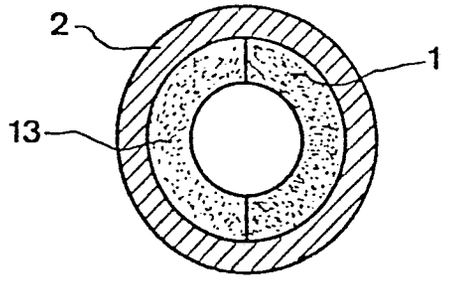

Fig. 14

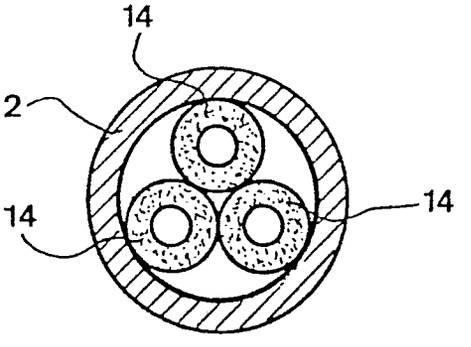

Fig. 15

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EUROPEAN SEARCH REPORT

Application number
EP 80 10 1839

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	DE - C - 966 177 (THE GAS MACHINERY CY.) * Claim 1; figure 1 *	1
	US - A - 1 834 304 (FRANCK) * Figure 9; page 2, lines 105 to 115 *	1
A	FR - A - 782 011 (FALLON)	
A	US - A - 2 788 957 (LINDQUIST)	
A	GB - A - 1 390 597 (SCHMIDT & CLEMENS)	

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

F 27 D 3/12

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

F 27 D
F 27 B
B 65 G

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	01-09-1980	COULOMB

EPO Form 1503.1 06.78