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(54) **A method of producing a composite component by using a preform**

(57) The inventive preform (2) which is used in the method of producing a composite component (3) comprises high wear resistant particles (4) which are placed on zones that need to be wear resistant, which are

brought together without an organic or an inorganic binder, and a container (1) wherein the particles (4) are placed. This preform (2) is developed by bringing together high wear resistant particles (4) without using any binders.

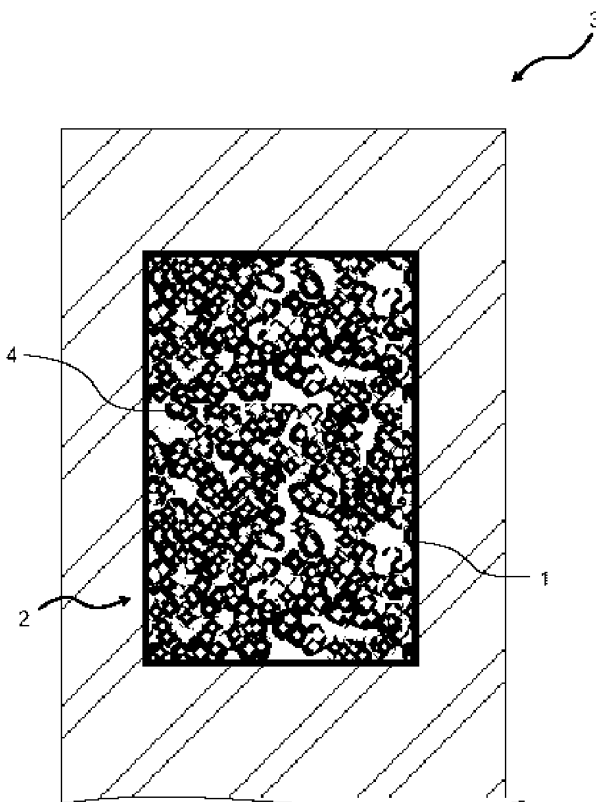


Fig: 4

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Description

[0001] This invention is related to forming a preform using high wear resistant particles and thus a method of producing a wear resistant composite component.

[0002] During the production of wear resistant parts, wear resistance is provided by placing wear resistant supports only on the zones of the relevant parts which are exposed to wear. Wear resistance is provided by placing a preform on these zones.

[0003] In the state of art of US patent no. 6520241, the preforms which are composed of high wear resistant particles are prepared by utilizing an organic or an inorganic binder and with a specific thickness restriction. These preforms of the relevant parts are placed with certain interval restrictions on the zones exposed to wear and later wear resistant components are produced by means of casting.

[0004] In the preforms, which are prepared by using any kind of binders, the quantity of the binder should be limited because the residue of the used binder decreases the cohesion formed between the support material and the matrix. Therefore, the quantity of the binders used for preparing preforms is restricted.

[0005] Another problem of the preforms prepared by using a binder is that the support phase ratio cannot be adjusted as desired.

[0006] In the embodiment of the patent disclosed above, in order to provide infiltration of porous preform by liquid metal the preforms are placed at a certain distances to each other and parallel to the wear surfaces will continuously change the wear rate of the component.

[0007] The objective of this invention is to develop preforms from wear resistant materials without using any binders.

[0008] Another objective of this invention is to produce a wear resistant composite component by placing preforms on the zones of the wear resistant components which are exposed to wear.

[0009] Another objective of this invention is to ensure the placement of the preforms in such a way that the component wear rate is constant through the wear zone.

[0010] A method of producing a composite component by using a preform realised in order to attain the objects of the invention has been illustrated in the attached drawings, wherein;

[0011] Figure 1 - is a general view of the container.

[0012] Figure 2 - is a view of an alternative embodiment of the container.

[0013] Figure 3 - is a view of an alternative embodiment of the container.

[0014] Figure 4 - is a cross-section view of the composite component.

[0015] Figure 5 - is a flow diagram of the method of producing composite components in which there are high wear resistance particles.

[0016] The components in the figures have each been

numbered corresponding the following:

1. Container
2. Preform
3. Composite component
4. Wear resistant particle

[0017] A preform (2) or preforms (2) which comprise high wear resistant particles (4) are placed on the zones of the wear resistance components which need to be wear resistant.

[0018] The inventive composite component (3) comprises a preform (2) which is used in the production method, high wear resistant particles (4) which are placed on zones that need to be wear resistant, which are brought together without an organic or an inorganic binder, and a container (1) wherein the particles (4) are placed. This preform (2) is developed by bringing together high wear resistant particles (4) without using any binders.

[0019] The wear resistant of the high resistant particles (4) could be wear resistant oxides, carbides, nitrides etc. or a mixture of these at a certain ratio.

[0020] In order to hold together the wear resistant particle (4) without using any binders, a container (1) is used which is made of any material which does not reduce the wear resistance of the component by leaving any residue. The container (1) is a structure wherein high wear resistant particles (4) are trapped and it is a chamber which allows molten metal to infiltrate into itself. The container (1) is made of a metallic or a non-metallic material and it could be composed of any kind of material which ensures wear resistant components to remain in the relevant zone and in the desired form until solidification is complete. At the same time, the container (1) should allow the liquid metal to go it and infiltrate through the wear resistant particles and also to melt away in such a way that it does not decrease the wear resistance of the components or their performance after the casting process over. The container (1), in which wear resistant particles (4) are placed in accordance with the material to be used in the formation of the container (1), could have a perforated or a porous structure. The objective here is to enable the molten metal to go into the container and infiltrate through the wear resistant particles (4). All the surfaces of the container could either be closed or it could have at least one open surface (Figure 1, Figure 2 and Figure 3).

[0021] In order to bring together high wear resistant particles (4) without using any binders, a preform (2) is developed by placing high wear resistant particles (4) inside the container (1) freely by calculating the ratio between the main body and the wear resistant particle (4). This preform (2) is placed on zones that need to have wear resistance during the production stage in such a way that the abrasion rate remains constant at the relevant zone.

[0022] A preform (2) is developed by placing high

wear resistant particles (4) inside the container (1) (101). The preform (2) which is developed by placing high wear resistant particles (4) inside the container (1) is placed inside a mould in order to obtain a wear resistant composite component (3) with a metallic matrix (102). During the placement of the preform (2), a formation of continuity by the preform (2) in the abrasion direction is ensured. As a container (1) is used to develop a preform (2), the shape of the preform (2) could be any as desired. This flexibility ensures production convenience. After the preform is placed inside the mould, preferably molten metal is poured into the mould (103). The molten metal at a specific temperature infiltrates the high wear resistant particles (4) present inside the container (1) by melting the container (1) (104). By using the container (1), more rapid and much easier infiltration of the molten metal through the high wear resistance particles (4) is ensured. The material which forms the container (1) during casting process, melts away without leaving behind any residue by being mixed with the molten metal infiltrated into the high wear resistance particles (4) (105). The cast product taken out of the mould after the casting process is complete, is a wear resistant composite component (3) (Figure 5) with a metallic main structure wherein high wear resistant particles (4) are present.

[0023] In the preferred embodiment of the invention, a wire mesh or a perforated plate made of stainless steel is used to make containers (1).

[0024] With the inventive preform (2), the process of bringing together wear resistant particles without using any binders is ensured. Furthermore, the wear resistant particles (4) are placed in such a way that the wear rate remains constant during operation.

2. A method of producing a composite component as defined in Claim 1 **characterized by** a preform (2) comprising a container (1) wherein wear resistant particles (4) are placed and which is composed of any kind of material that does not leave behind residuum after the casting process is over and which allows the molten material to penetrate inside itself.
3. A method of producing a composite component as defined in Claim 1 and 2 **characterized by** a container (1) wherein all its surfaces are closed.
4. A method of producing a composite component as defined in Claim 1 and 2 **characterized by** a container (1) wherein at least one surface is open.
5. A method of producing a composite component as defined in Claim 1, 2, 3 and 4 **characterized by** container (1) which has a perforated structure.
6. A method of producing a composite component as defined in Claim 1, 2, 3 and 4 **characterized by** container (1) which has a porous structure.
7. A method of producing a composite component as defined in Claim 1, 2, 3, 4 and 5 **characterized by** container (1) which is made of wire mesh or perforated plate.

Claims

1. A method of producing a composite component wherein wear resistant particles (4) are present comprising the steps of developing a preform (2) by bringing together wear resistant particles (4) without using an organic or an inorganic binder and placing them inside a container (1) which enables them to be placed on zones which need to be wear resistant (101), placing the said preform inside a mould (102), pouring the preferably molten metallic material after the preform is placed inside the mould (103), infiltration of the molten material which is at a specific temperature into the wear resistant particles (4) located inside the container (1) by melting the walls of the container (1) (104), melting away of the material which composes the container (1) without leaving behind any detrimental residue by being mixed with the molten material which is infiltrated through the wear resistant particles (4) (105) and removing the product from the mould when the casting process is complete (106).

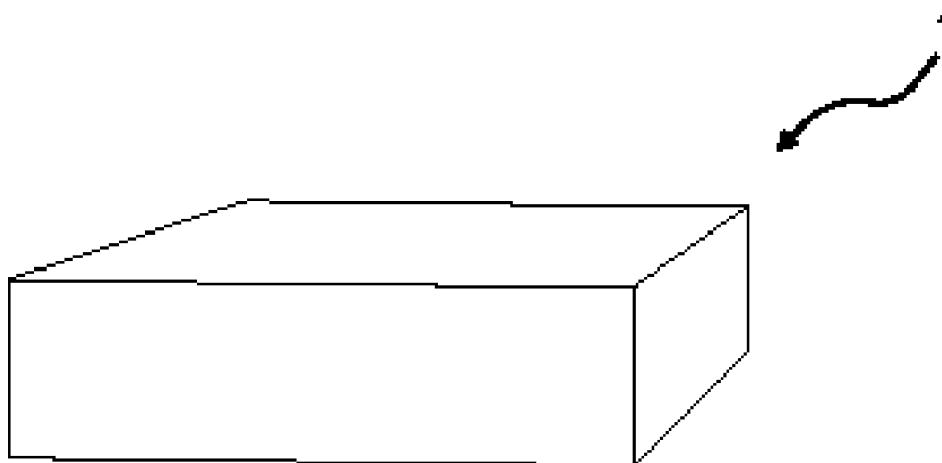


Fig: 1

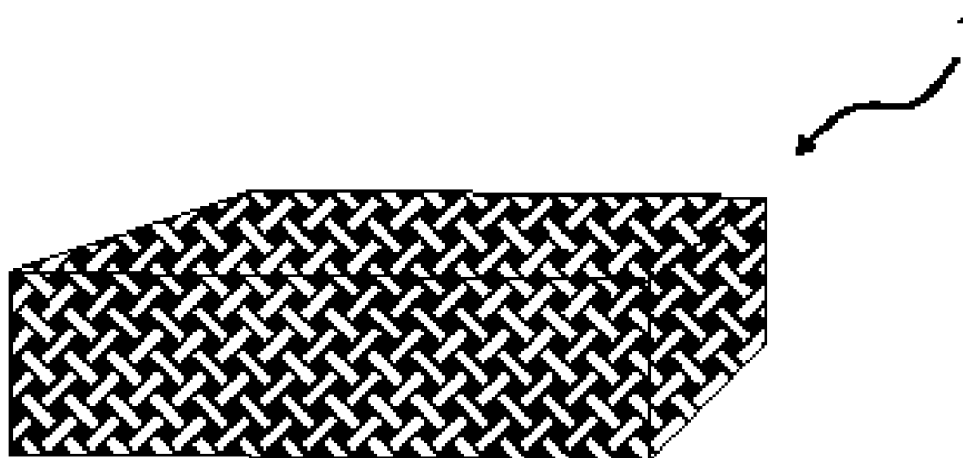


Fig: 2

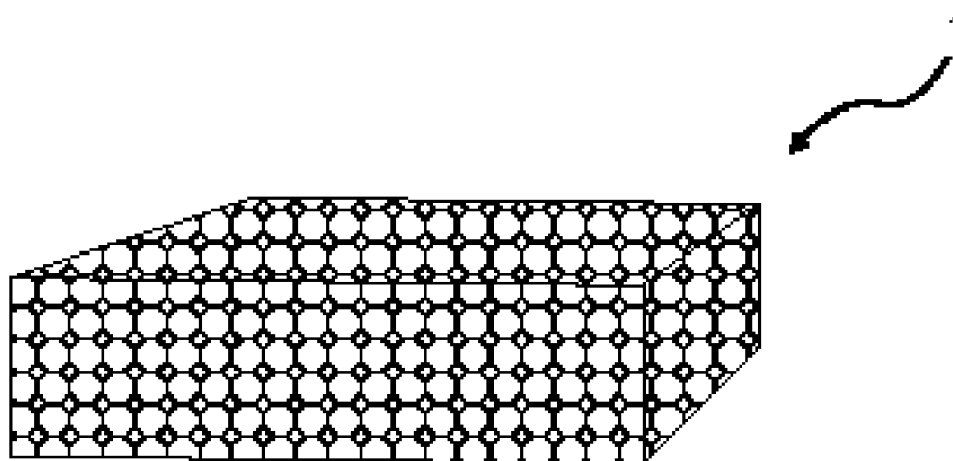


Fig: 3

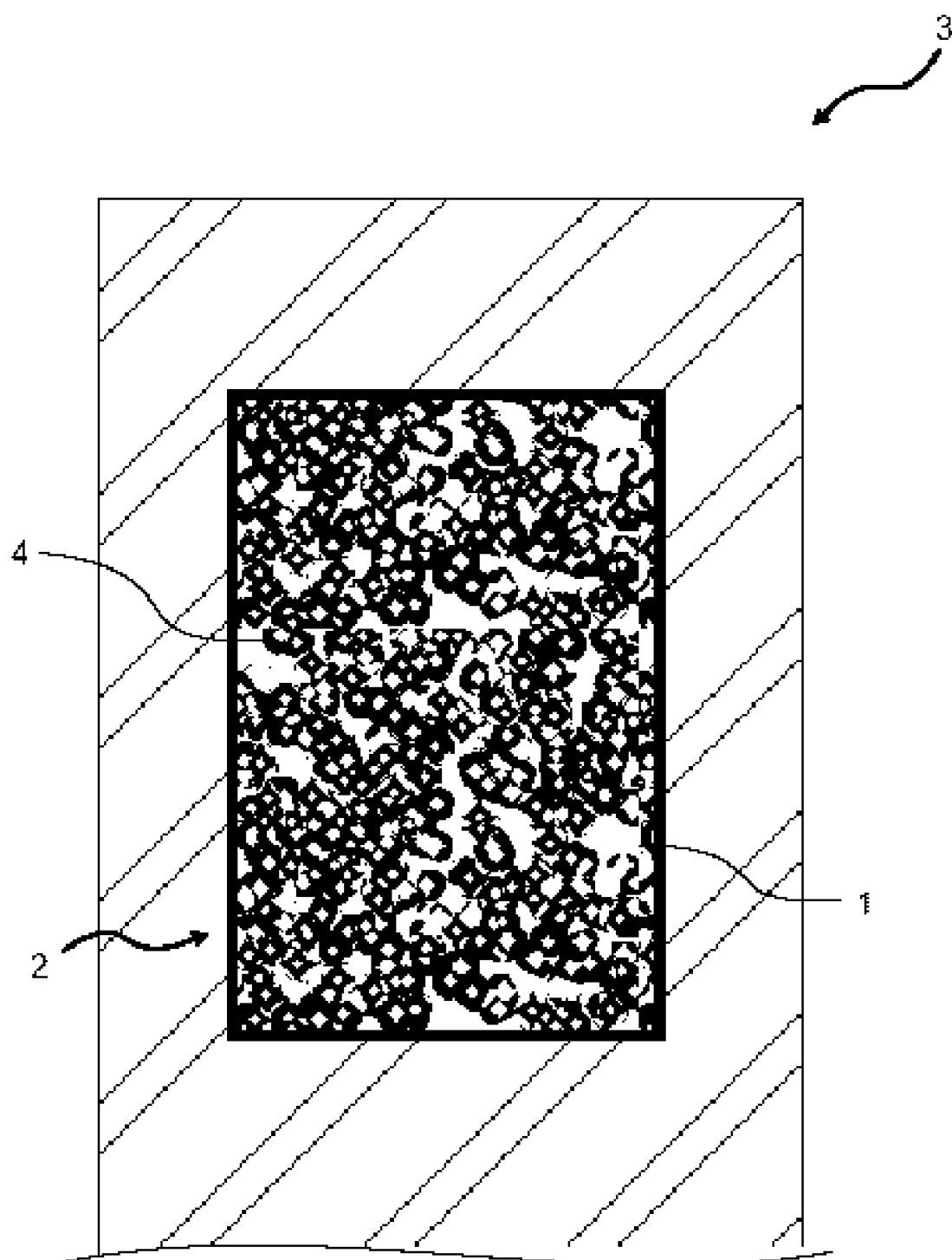


Fig: 4

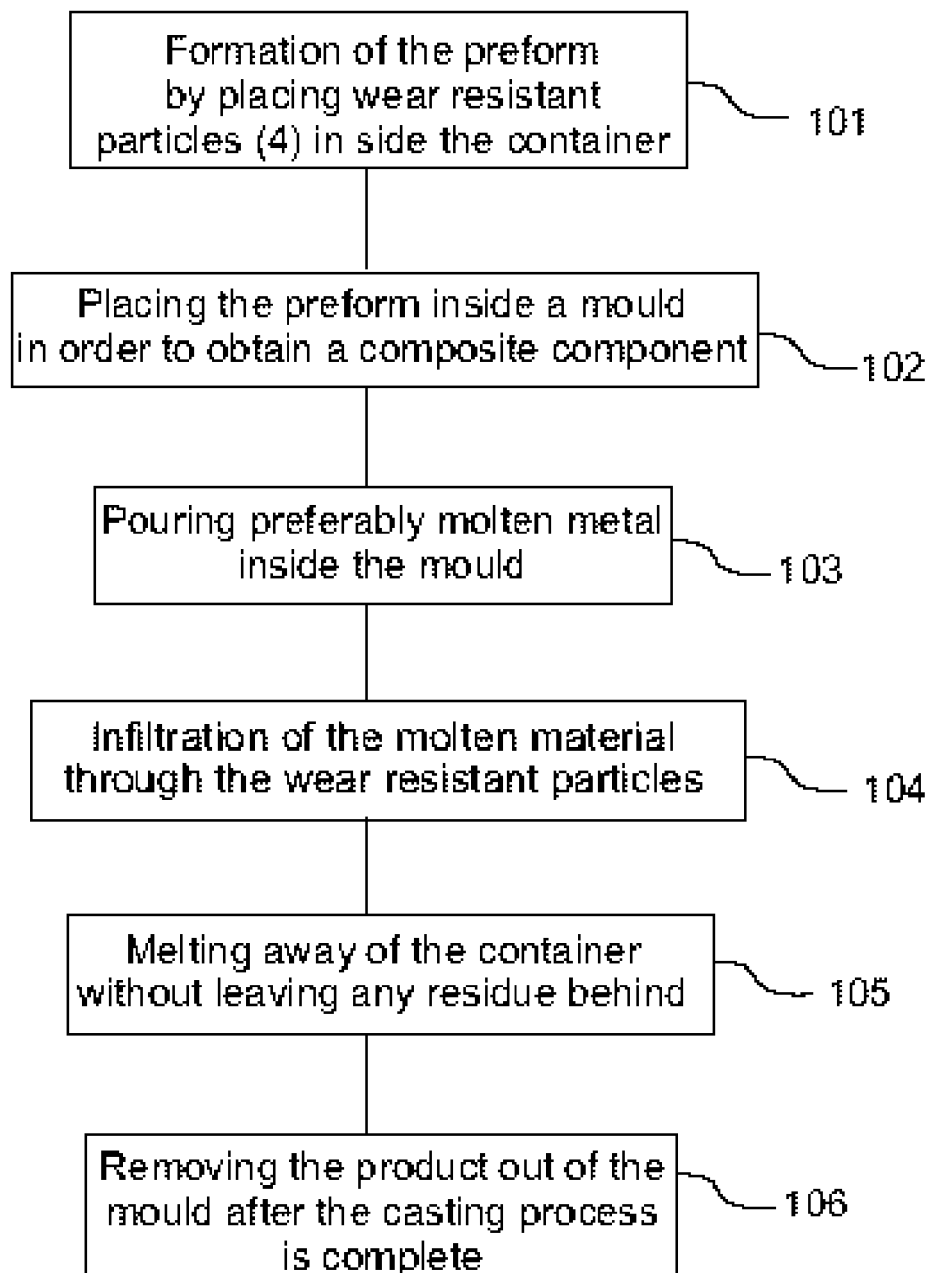


Fig: 5



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EUROPEAN SEARCH REPORT

Application Number
EP 04 10 3629

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Place of search Munich		Date of completion of the search 13 October 2004	Examiner Brown, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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