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(54) **MANUFACTURED ARTICLE FOR ROAD KERBS AND/OR EDGINGS AND METHOD FOR THE PRODUCTION THEREOF**

(57) Method for producing a manufactured article (1) for road kerbs or edgings (100) comprising the steps of: arranging a given amount of asphalt conglomerate (CA) and a given amount of elastomeric material (CE) in a container (3), heating said asphalt conglomerate (CA) and said elastomeric material (CE) to bring them to a semi-liquid/liquid state, mixing the asphalt conglomerate (CA) and the semiliquid/liquid elastomeric material (CE) so as to obtain a homogeneous elastomeric asphalt conglomerate (CAE) in a semiliquid/liquid state, pouring the homogeneous elastomeric asphalt conglomerate (CAE) in semi-liquid/liquid state into a cavity (9) of a mould (8) shaped so as to make a negative trace of the shape of the manufactured article (1), and extracting the manufactured article (1) from the cavity (9).

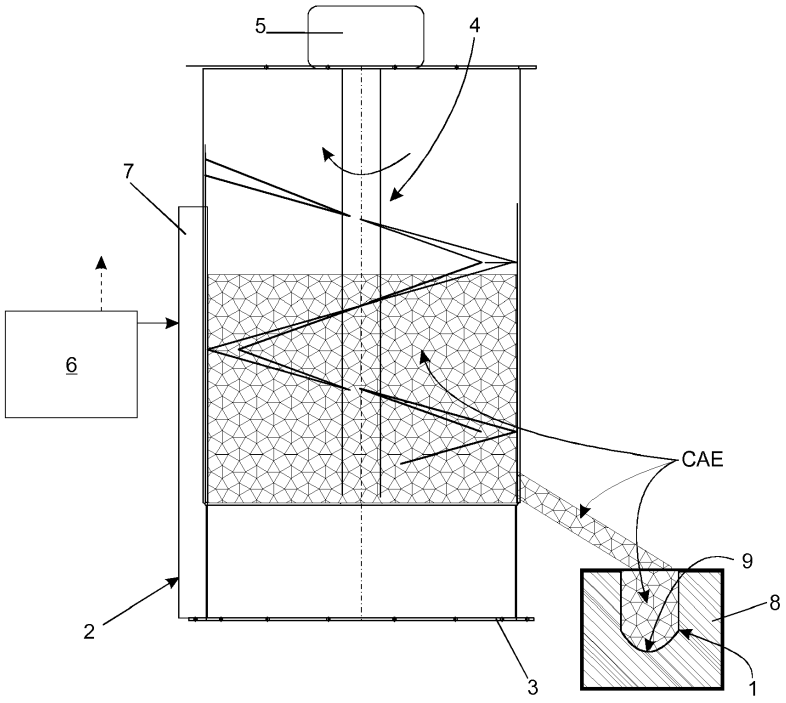

Fig. 5

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Description

[0001] The present invention concerns a manufactured article for road kerbs and/or edgings and a method for the production thereof.

[0002] In particular, the present invention concerns the production of manufactured road articles produced by means of an elastomeric asphalt conglomerate, usable for the formation of kerbs and/or edgings for cycle paths, pavements, traffic islands, speed humps, roundabouts, road barriers or similar to which the following description will explicitly refer without loss of generality.

[0003] There is often the need to intervene on stretches of road in asphalt to create road barriers or kerbs that delimit roundabouts, for example at crossroads, or create edgings which delimit traffic islands or pavements, or similar road constructions.

[0004] The methods currently used to produce a road kerb, for example for the construction of a roundabout, generally entail: performing cutting operations on the road surface, excavating the cut portion of the road surface to remove the asphalt, thus obtaining a roadbed with predefined depth for the creation of a foundation, positioning formworks in the excavated roadbed, arranging a steel reinforcement in the formworks, pouring cement into the formworks thus burying the reinforcement and creating a reinforced concrete base and, after solidification of the reinforced concrete base, positioning prefabricated concrete manufactured articles to rest on the base, then rigidly connecting the supporting surface of each manufactured article to the base below via a layer of mortar.

[0005] The methods described above are particularly complex and costly, and take a long time to produce with obvious consequences in terms of safety and traffic circulation.

[0006] Furthermore, said methods have a considerable environmental impact both in the production phase, since they require an operation to dispose of the asphalt removed for preparation of the bed, and when demolition of the existing kerbs is required since it is necessary to separate the concrete from the steel, with all resulting disposal costs.

[0007] The Applicant has therefore carried out an in-depth study with the objective of identifying a solution relative to a method for producing manufactured articles for road kerbs or edgings which overcomes the above drawbacks.

[0008] The object of the present invention is therefore to make available a solution that allows achievement of the above objective.

The object of the present invention is therefore to produce a manufactured article for road kerbs and provide a method for producing said manufactured article.

[0009] This object is achieved by the present invention since it is relative to a manufactured article and a method for producing the manufactured article as described in the attached claims.

[0010] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limiting embodiment example thereof in which:

- Figure 1 is a schematic perspective view of the manufactured road article produced according to the teachings of the present invention;
- Figures 2 to 6 show schematically an equal number of operating phases of the method for producing the manufactured article provided according to the teachings of the present invention;
- Figure 7 shows schematically an example of installation on an asphalt road surface of the manufactured article produced according to the teachings of the present invention;
- Figure 8 shows a section view of a portion of kerb arranged to rest on the asphalt road surface comprising two adjacent manufactured articles produced according to the teachings of the present invention.

[0011] With reference to Figure 1, the number 1 indicates overall a manufactured article 1 structured to be used for creating road kerbs and/or edgings 100 and/or similar structures/works. It is understood that the kerb and/or the edging 100 formed from the manufactured articles 1 produced according to the present invention can be used to form, for example, roundabouts, traffic islands, carriageways, cycle paths, and/or also to form speed humps, road barriers, guardrails (mini New Jersey) and/or other similar elements for road use (and/or having the function of street furnishing).

[0012] In the example shown in Figure 1, the manufactured article 1 can have, for example, a substantially elongated parallelepipedal shape which extends along a longitudinal axis L and consists of an elastomeric asphalt conglomerate indicated in Figures 2 to 6 by CAE. It is understood that the shape and section of the manufactured article 1 depends on the shape and section respectively of the kerb or edging to be produced.

[0013] The elastomeric asphalt conglomerate forming the manufactured article 1 comprises a first material and a second material appropriately metered and mixed with each other by means of the method that will be described in detail below.

[0014] The first material is based on an asphalt conglomerate (indicated by CA in Figures 2 and 5), preferably but not necessarily recycled asphalt, while the second material (indicated by CE in Figures 2 and 5) is based on elastomeric material. The asphalt conglomerate corresponding to the recycled asphalt can be conveniently obtained by removing the upper layer of an asphalt road. The recycled asphalt used can comprise pieces commonly indicated as pieces of "crust asphalt", having dimensions varying between approximately 5 cm and 50 cm, or, if obtained by means of milling and therefore broken up, the asphalt can comprise pieces having reduced

dimensions, for example between approximately 3 cm and 5 cm.

[0015] The asphalt conglomerate forming the first material can comprise: filler (limestone or basaltic rock or similar), sand, inert materials (rubble or similar) having a predefined granulometry, and bitumen composed in turn of natural or residual hydrocarbons deriving from distillation or refinement of petroleum. Preferably, the recycled asphalt comprises a percentage of bitumen between approximately 3% and approximately 6% of the weight of the asphalt, preferably approximately 4%.

[0016] According to a preferred embodiment, the second material based on elastomeric material consists of an elastomeric bituminous material, preferably polymerized.

[0017] The elastomeric bituminous material can comprise bitumen mixed with a percentage of elastomeric material ranging between approximately 3% and approximately 6%, preferably approximately 5% of the weight of the bitumen.

[0018] The elastomeric bituminous material can comprise preferably, but not necessarily, in addition to the bitumen and to the elastomeric material, also a percentage of plastomer material between approximately 3% and approximately 5%, preferably 4% of the weight of the bitumen.

[0019] The Applicant has found that an elastomeric bituminous material mixable with the recycled asphalt for production of the manufactured article can be an elasto-bituminous sealant or a bitumen-rubber mastic, generally used for sealing road cracks.

[0020] For example, a bitumen-rubber mastic can correspond to the product named Stratos ARS 3.I TMP (Art IARS 31) marketed by ISOLTEMA® Stick and Seal characterized by: an elastic recovery of 85%, a hardness of 60 Index and a softening temperature higher than 125°C. As regards the elasto-bituminous sealant, it consists of petroleum bitumen asphalt and elastomers with high toughness and resistance, micronized mineral fillers and stable plasticizers which do not exude and do not migrate. For example, the elasto-bituminous sealant can correspond to the products named Intermastik-C or Interplast 1806 produced by Interchimica SRL, or the product HELAX 15-KTF produced by the company "Italiana Bitumi ed Affini SRL" and characterized by softening point ranging from 95° to 125° and elongation - test piece 3 mm thick - greater than 1200%.

[0021] Preferably, the weight percentage of the elastomeric bituminous material in the manufactured article 1 can be between approximately 6% and approximately 10%, preferably 8%.

[0022] With reference to Figures 2 to 6, the method for producing the manufactured article 1 will be described below.

[0023] In particular, with reference to Figure 2, the method preferably comprises the step of arranging a given amount of asphalt conglomerate, preferably recycled and crushed/broken up (in a solid state), i.e. reduced to small pieces, obtained for example by means of milling and/or removal of the layer of asphalt forming the "crust" of a road surface.

[0024] The method further comprises the step of arranging a given amount of elastomeric bituminous material. The elastomeric bituminous material can preferably be composed of cakes preferably having a weight of approximately 10Kg or 25 Kg.

[0025] The method further comprises the step of arranging a melting-mixing system or apparatus 2, which is structured so as to: receive the first material, i.e. the asphalt conglomerate CA and the second material, i.e. the elastomeric bituminous material CE, heat the asphalt conglomerate CA and the elastomeric bituminous material CE thus bringing them to a liquid/semi-liquid state and mix the asphalt conglomerate CA and the elastomeric bituminous material CE thus forming an elastomeric asphalt conglomerate CAE which is homogeneous (without air bubbles) in the semi-liquid state.

[0026] According to an embodiment provided by way of example shown in Figure 2, the melting-mixing apparatus 2 can comprise a preferably cylindrical metal receptacle or container 3 adapted to receive and contain the asphalt conglomerate and the elastomeric bituminous material, heating equipment 7 adapted to heat the asphalt conglomerate CA and the elastomeric bituminous material CE under the control of the electronic control system 6, thus bringing both from a solid state to an approximately semi-liquid/liquid state, and mixing members 4 rotated inside the container 3 by a drive unit 5, preferably an electric motor controlled by an electronic control system 6, for mixing the asphalt conglomerate CA and the elastomeric bituminous material CE, thus obtaining the elastomeric asphalt conglomerate CAE in an approximately semi-liquid/liquid state.

[0027] The heating equipment 7 can comprise for example resistive electric elements and/or gas or diesel burners and/or pipes for the circulation of diathermic oil or similar devices adapted to provide heat preferably to the walls of the container 3.

[0028] With reference to Figure 3, the method further entails arranging at least one formwork or forming mould 8, preferably made of metallic material, which has an inner seat/cavity 9 that reproduces in negative the outer shape of the manufactured article 1 to be produced.

[0029] With reference to Figure 2, the method comprises the step of feeding/pouring the asphalt, preferably in fragments or crust, and the elastomeric bituminous material, preferably in the form of cakes, into the container 3.

[0030] It is understood that the quantity of asphalt conglomerate CA and the quantity of elastomeric bituminous material fed/poured into the container 3 depends on the number of manufactured articles 1 to be produced. If N manufactured articles have to be produced, a quantity of the first and second material is fed in, corresponding to the first and second quantity respectively, each multiplied by a multiplication factor N.

[0031] For example, if approximately 1500 Kg of elas-

tomeric asphalt conglomerate CAE have to be produced to create a plurality of manufactured articles, approximately 90 Kg of cakes of elastomeric bituminous material and approximately 1410 Kg of recycled asphalt can be used, for example.

[0032] In the example shown and described in Figures 2-6 reference will be made, solely in order to increase understanding of the present invention, to the production of one single manufactured article 1.

[0033] With reference to Figure 2, the method comprises the step of controlling by means of the electronic control system 6 the heating equipment 7, to heat, for example by means of the walls of the container 3, the asphalt conglomerate CA constituting the first material and the elastomeric bituminous material CE constituting the second material, thus bringing them to a predefined melting temperature. The electronic control system 6 further controls rotation of the mixing members 4 for mixing the asphalt conglomerate CA and the elastomeric bituminous material CE, which have been melted, thus obtaining the homogeneous elastomeric asphalt conglomerate CAE.

[0034] Preferably, the heating equipment 7 is controlled so that the melting temperature is maintained between approximately 160°C and approximately 200°C, preferably 180°C, while the mixing range can be between approximately two hours and approximately six hours, preferably four hours.

[0035] The method further comprises the step of feeding/pouring the homogeneous elastomeric asphalt compound CAE present in the container 3 into the seat/cavity 9 of the mould 8 (Figure 5). Preferably, before pouring the elastomeric asphalt conglomerate CAE into the seat/cavity 9 of the mould 8, the method comprises the step of depositing/covering the inner surface of the seat/cavity 9 by means of a release agent DIS (Figure 4) structured to detach the elastomeric asphalt compound CAE from the inner metallic surface of the seat/cavity 9 after solidification of the elastomeric asphalt compound CAE in the seat 9.

[0036] Preferably, the agent DIS is a silicone-based material. For example, a release agent can correspond to the product E 55 LO ® marketed by F.IN.CO S.R.L.

[0037] The method further comprises the step of cooling the elastomeric asphalt conglomerate CAE in the cavity 9 of the mould 8 for a predefined solidification period and at the end of the latter, extracting the solidified manufactured article 1 from the cavity 9 of the mould (Figure 6). Preferably the solidification period can range between approximately two four and approximately six hours.

[0038] The method can further comprise the step of carrying out a surface finishing operation on the outer surface of the manufactured article 1 thus making it coarse/rough so as to obtain a non-slip surface. The Applicant has found that a coarse/rough outer surface of the manufactured article conveniently increases the grip of the wheels which come into contact with the contact surface of the manufactured article, for example at roundabouts, and therefore reduces the risk of slipping/falling of motorcyclists. According to a possible embodiment, the surface finishing operation on the outer surface of the manufactured article 1 can be carried out by sandblasting. The sandblasting can be performed with a sandblaster generating an air mixture of compressed air and abrasive microspheres having dimensions ranging between approximately 0.5 mm and 2 mm, preferably between approximately 0.7 mm and approximately 1.2 mm.

[0039] The method can further comprise the step of superficially colouring the manufactured article 1 thus creating road markings in the form of lines/images. The Applicant has found that the asphalt composition of the manufactured article and the coarse/rough surface allow the use of coloured paints for asphalt. It should be specified that the paints applied on concrete manufactured articles (known art) form a surface film which tends to detach/deteriorate in a relatively short time, whereas the paints for asphalt when applied to the manufactured article produced according to the teachings of the present invention adhere and penetrate permanently therein for a certain depth. Therefore the use of paints for asphalt in the manufactured article described considerably prolongs the life of the marking lines/images. The paint for asphalt (RAL for asphalt) could be a solvent paint based on modified glycerophthalic resins and chlororubber and could comprise, for example, the paint named SPARTITRAFFICO produced by IVAS spa.

[0040] It is understood that the method allows the production of a plurality of manufactured articles and therefore entails a plurality of moulds 8 inside which the elastomeric asphalt conglomerate CAE can be poured.

[0041] According to a possible embodiment, the melting-mixing apparatus 2 can have a transportable structure and/or be self-propelled so that it can be conveniently positioned in the place in which the kerb or edging 100 is required. In this case, with reference to Figure 7, the method can comprise the step of arranging moulds 8 shaped so as to allow production of the manufactured article directly on the surface S. For example, the moulds 8 can be shaped so as to allow injection from above of the elastomeric asphalt conglomerate CAE into the seat 9 and allow extraction of the manufactured article 1 by raising the mould 8 upwards, for example in a vertical direction. In this case, the method can entail, for example, positioning the moulds 8 in the points/areas in which the manufactured articles are required so as to present, for example, the opening of the mould 8 for extraction of the manufactured article 1 facing the asphalt surface S, injecting the elastomeric asphalt conglomerate CAE into the seats 9 of the moulds 8 so that the elastomeric asphalt conglomerate CAE is deposited on the surface of the asphalt S and, after the solidification period of the conglomerate inside the mould 8, sliding the mould 8 off the manufactured article 1 for example by vertically raising the mould 8 thus separating it from the manufactured article 1 which, during solidification, has become fixed to the surface S of the asphalt layer.

[0042] The applicant has found that in this way non-

removable fixing is conveniently obtained between the lower base B of the manufactured article 1, which is in a semi-solid (softened) state, and the underlying asphalt road surface S. This is possible due to the fact that the asphalt composition of the manufactured article is substantially compatible with the composition of the asphalt of the road. In this way the manufactured article 1 is rigidly joined to the underlying road surface.

[0043] According to a possible embodiment in which the manufactured article 1 is prefabricated and transported to the place in which construction of the kerb is required, the method comprises, during installation of the manufactured article 1, the step of heating the base B of the solid manufactured article 1 thus bringing it to a semi-solid softened state and laying the same on the underlying asphalt surface S so that the base B is fixed/joined in a non-removable manner to the surface S.

[0044] With reference to Figure 8, according to a possible embodiment in which the manufactured article is prefabricated and transported to the place where construction of the kerb 100 is required, the method comprises the step of joining/fixing the base B of the manufactured article 1 to the road surface S by means of the interposition of a tape/film R made of elastomeric bituminous material appropriately heated/softened.

[0045] The method has numerous advantages: the elastomeric asphalt composition of the manufactured article allows the latter to be installed directly on the upper part of the road surface in a simple rapid manner and at low cost.

[0046] Furthermore, the presence of the elastomeric component in the manufactured article allows the same to elastically withstand the mechanical stress generated on it during the passage of vehicles. Furthermore, the simplicity of execution of the method allows production of the manufactured article directly on the road construction site. Furthermore, the method allows the manufactured article to be produced from a recycled product, i.e. asphalt. Lastly, the manufactured article, due to its composition substantially similar to that of asphalt, can be demolished and recycled simultaneously with the demolition/reconstruction of an asphalt road surface with all the advantages this entails in environmental terms and in terms of containment of the demolition costs.

[0047] Lastly it is clear that modifications and variations as established by the claims can be made to the method and the manufactured article described above without departing from the scope of the present invention.

Claims

1. Method for producing an elastomeric asphalt manufactured article (1) for road kerbs and/or edgings (100) **characterised in that** it comprises the steps of:

   arranging a given amount of asphalt conglomerate (CA) and a given amount of elastomeric material (CE) in a container (3);

   heating said asphalt conglomerate (CA) and said elastomeric material (CE) in said container (3) so as to cause said asphalt conglomerate (CA) and said elastomeric material (CE) to change from a solid state to a semi-liquid/liquid state;

   mixing said asphalt conglomerate (CA) and said semi-liquid/liquid elastomeric material (CE) so as to obtain a homogeneous elastomeric asphalt conglomerate (CAE) in a semi-liquid/liquid state;

   pouring the homogeneous elastomeric asphalt conglomerate (CAE) in semi-liquid/liquid state into a cavity (9) of a forming mould (8) shaped so as to make a negative trace of the shape of the manufactured article (1) to produce;

   extracting the manufactured article (1) from said cavity (9) of said mould (8) following a predetermined solidification period.

2. Method according to claim 1, wherein said asphalt conglomerate (CA) is constituted of recycled asphalt.

3. Method according to claim 2, wherein the elastomeric material (CE) is constituted of elastomeric bituminous material.

4. Method according to claim 3, wherein the elastomeric bituminous material (CE) comprises a percentage of elastomeric material from about 3% to about 5% by weight of the bitumen.

5. Method according to claim 1, wherein said step of pouring the semi-liquid/liquid homogeneous elastomeric asphalt conglomerate (CAE) into said cavity (9) of said mould (8) is preceded by the step of depositing on the internal surface of said cavity (9) a silicone-based release agent (DIS).

6. Method according to claim 1, comprising the step of heating said asphalt conglomerate (CA) and said elastomeric material (CE) so as to reach a melting temperature from about 160°C to about 200°C.

7. Method according to claim 1, comprising the step of: arranging said mould (8) on the asphalt surface (S) on which the kerb or edging (100) is to be produced, pouring said elastomeric asphalt conglomerate (CAE) into the seat (9) of said mould (8) so that the elastomeric asphalt conglomerate (CAE) forming the supporting base (B) of the manufactured article (1) is deposited on, and solidifies in contact with, the asphalt surface (S) below.

8. Manufactured article (1) for road kerbs or edgings

(100) **characterised in that** it is constituted of an elastomeric asphalt conglomerate (CAE).

9. Manufactured article according to claim 8, wherein said elastomeric asphalt conglomerate (CAE) comprises recycled asphalt (CA) and an elastomeric material (CE).

10. Use of an elastomeric asphalt conglomerate (CAE) for the production of a manufactured article (1) for road kerbs and/or edgings (100).

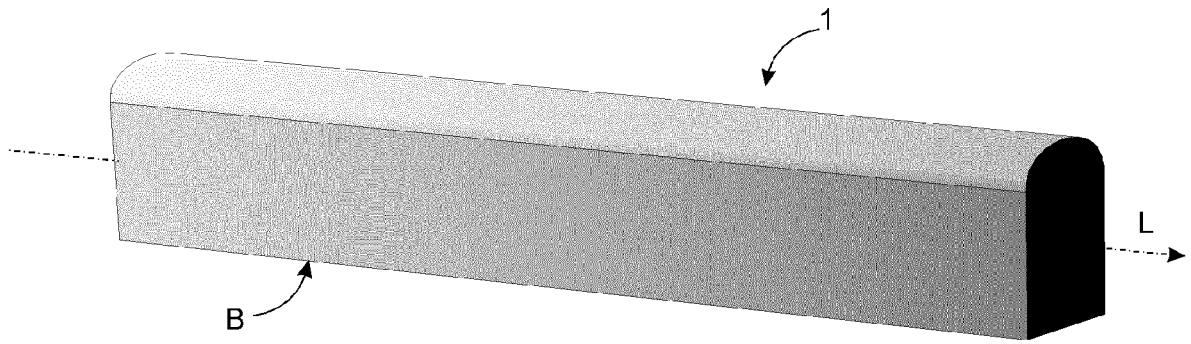

Fig. 1

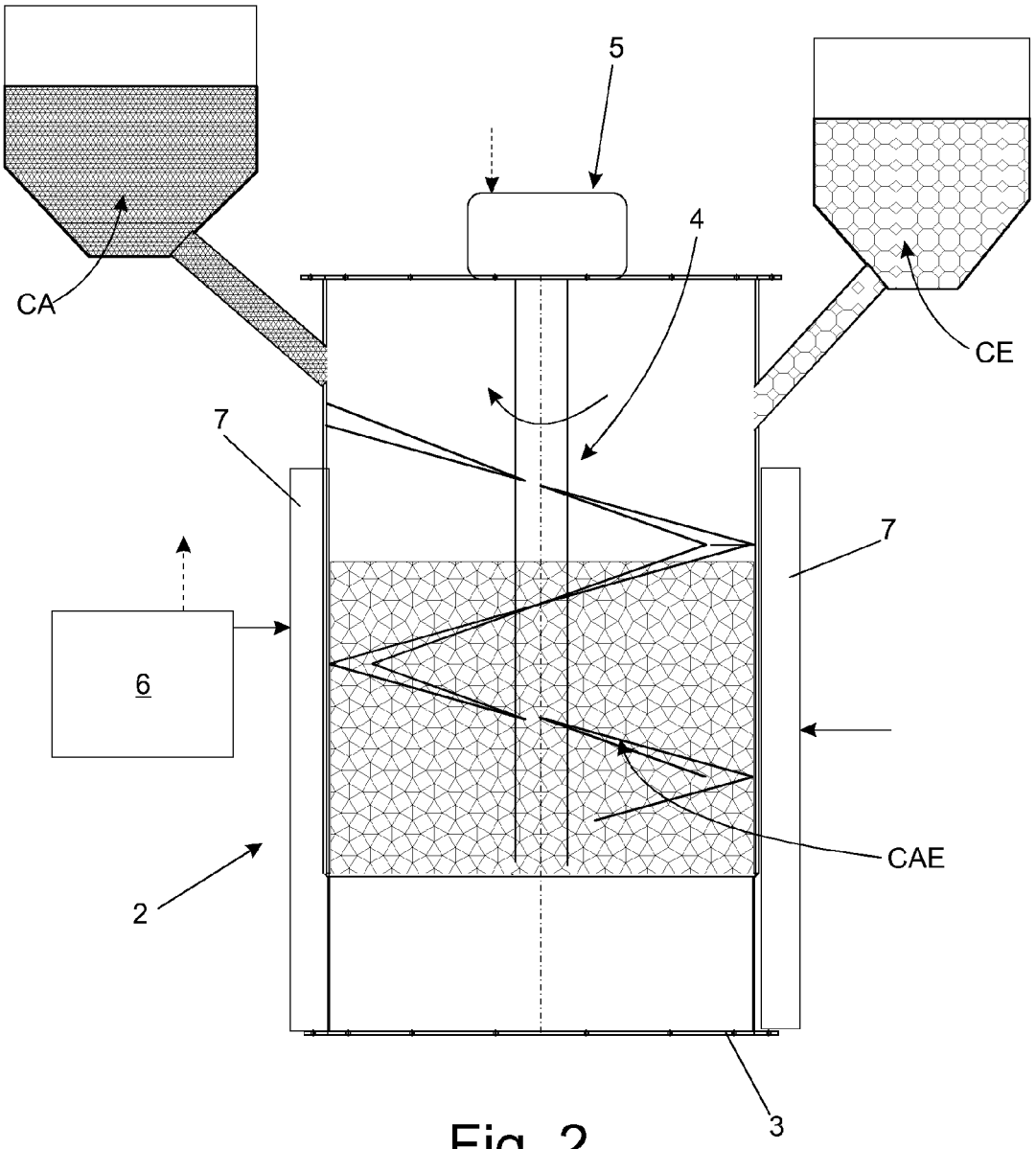

Fig. 2

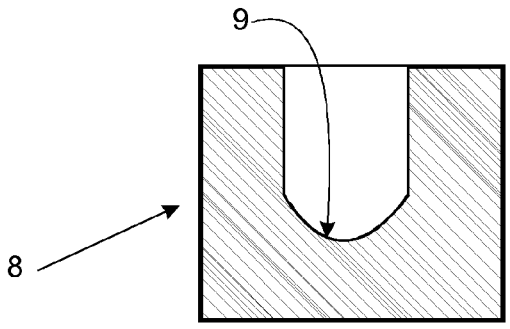

Fig. 3

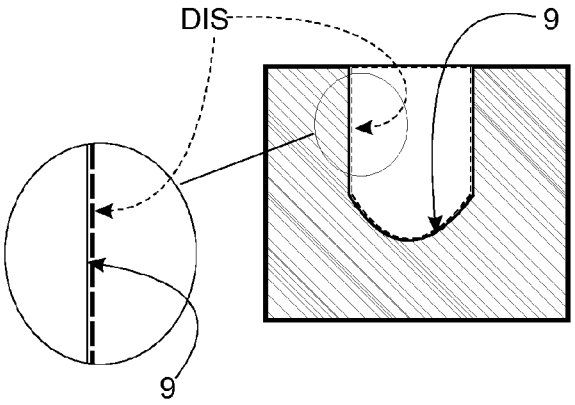

Fig. 4

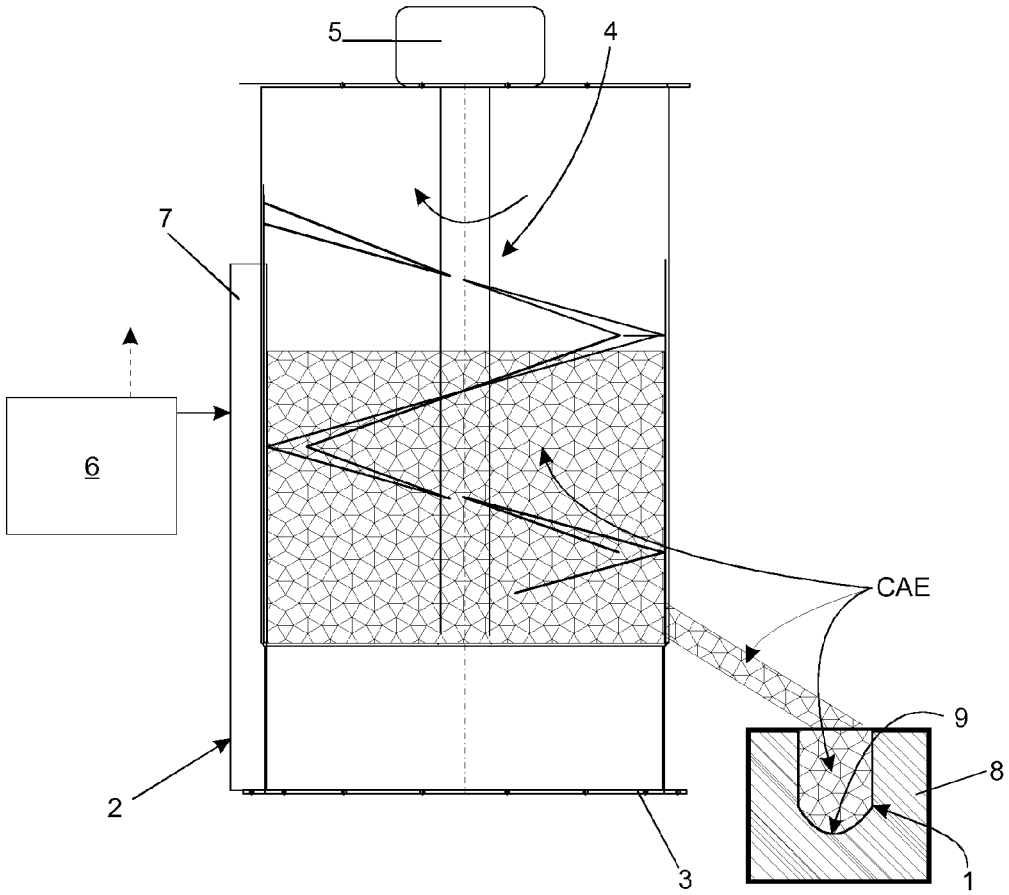

Fig. 5

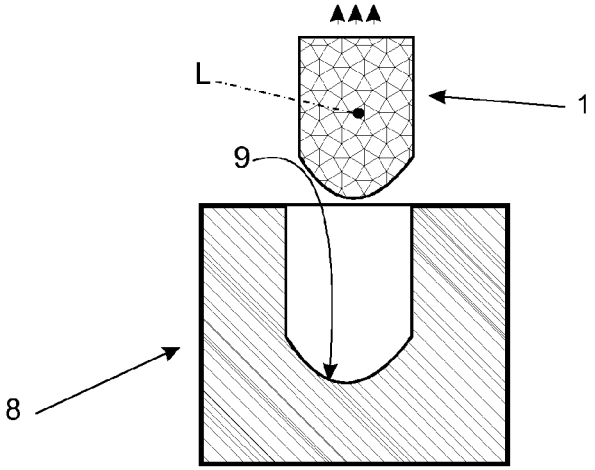

Fig. 6

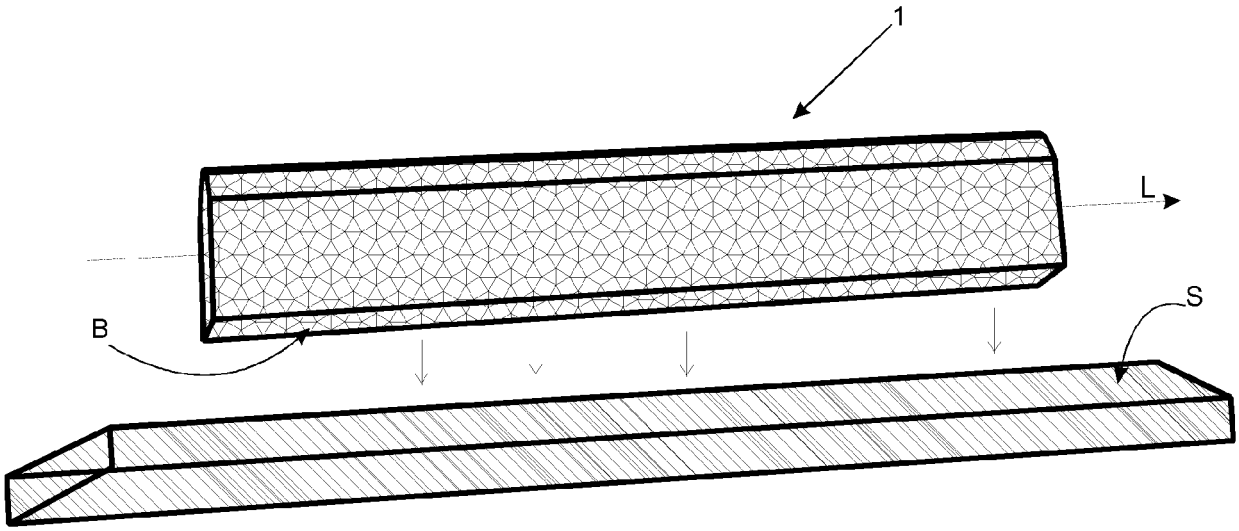

Fig. 7

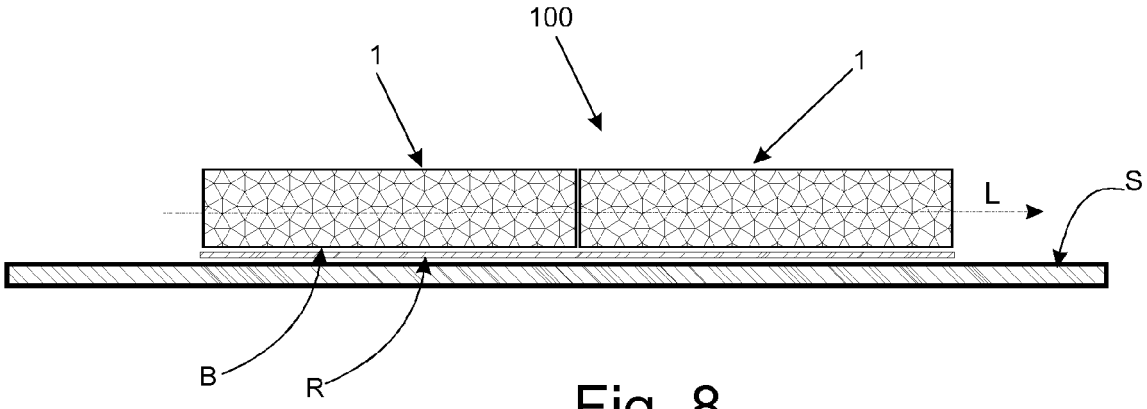

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 5375

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	FR 2 712 014 A1 (EYROLLE CHRISTIAN [FR]) 12 May 1995 (1995-05-12) * the whole document *	1,3	
Y	US 4 151 344 A (DOSS RICHARD C [US] ET AL) 24 April 1979 (1979-04-24) * the whole document *	5	

TECHNICAL FIELDS SEARCHED (IPC)

E01C
B29K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 September 2017	Beucher, Stefan

CATEGORY OF CITED DOCUMENTS

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29-09-2017

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