

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2023/075386

International filing date (day/month/year)
15.09.2023

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC

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B33Y10/00

Applicant
CEMEX INNOVATION HOLDING AG

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Voltz, Eric

Telephone No. -0



Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed.
 - b. ☐ furnished subsequent to the international filing date for the purposes of international search (Rule 13*ter*.1(a)),
 - ☐ accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.
4. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established to the extent that a meaningful opinion could be formed without a WIPO Standard ST.26 compliant sequence listing.
5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-11</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-11</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-11</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

1 Cited documents

Reference is made to the following documents:

- D1 US 2022/250986 A1 (FEICHTENSCHLAGER BERNHARD [DE] ET AL) 11 August 2022 (2022-08-11)
- D2 US 2019/194072 A1 (ESNAULT VIVIEN [FR] ET AL) 27 June 2019 (2019-06-27)
- D3 US 2021/355031 A1 (CHUNG BYONG-WA [US] ET AL) 18 November 2021 (2021-11-18)
- D4 US 2021/284575 A1 (MARTINAGE OLIVIER [FR] ET AL) 16 September 2021 (2021-09-16)

2 Independent claim 1

- 2.1 D1 (the references in parentheses applying to this document) is considered to be the prior art closest to the subject-matter of independent claim 1 and discloses

Formless production process for fresh construction material containing hydraulic binder ([0007]) comprising or consisting of the following steps :

A- Preparing a second construction material from the following mix design of a first construction material ([0237]) *in a concrete-type mixer or concrete batching plant or local static concrete mixer or concrete truck (considered to be implicitly disclosed)*:

- Binder ([0216]) *(100 to 800 kg/m³ of CM1) (features between brackets are regarded as facultative in the meaning of the PCT Guidelines 5.23);*
- Water ([0236]) *(50 to 350 Kg/m³ of CM1);*
- Sand ([0238]) *(10 to 1500 Kg/m³ of CM1);*
- Aggregates having a size from 4-16mm ([0237]), preferably from 4-12 mm *(0 to 1500 Kg/m³ of CM1); and*

an admixture system ("component A of the additive" according to [0243]) which is added to CM1 to obtain the second construction material, ~~wherein ADMS1 comprises at least a high molecular weight, non-ionic water soluble component (ADMS1-CA), and is dosed at a range between 0.001 weight % and 2 weight % of binder content,~~

B- Transporting the second construction material obtained in A- from the concrete-type mixer or concrete batching plant or local static concrete mixer or concrete truck to an extruding device ([0246]), while adding a second admixture system ("component B of the additive kit") to the second construction material to obtain a third construction material that is moving inside the extrusion device towards the nozzle/die, uphill from the extrusion nozzle or die of the extruding device yet at a distance is located between 0.2 m and 4.0 m from the extrusion nozzle or die ([0246]), ~~wherein ADMS2 comprises at least a polymerized system containing a conjugated or aromatic, bi- or poly-ring system that contains solubilizing functional groups (ADMS2-CA), and is dosed at a range of 0.01 % to 5% of the binder content.~~

C- Extruding the third construction material obtained in B- through the extrusion nozzle or die ([0246]).

D- Recovering the stiffened construction material after the nozzle or printer head.

- 2.2 The subject-matter of independent claim 1 differs therefore from this known process of D1 in that ADMS1 comprises at least a high molecular weight, non-ionic water soluble component (ADMS1-CA), and is dosed at a range between 0.001 weight % and 2 weight % of binder content and ADMS2 comprises at least a polymerized system containing a conjugated or aromatic, bi- or poly-ring system that contains solubilizing functional groups (ADMS2-CA), and is dosed at a range of 0.01 % to 5% of the binder content.
- 2.3 Under consideration of §9 of Item VIII, the selection of ADMS1 (the first admixture system) and ADMS2 (the second admixture system) ensures that a chemical strong interaction occurs between ADMS1 and ADMS2 thereby providing the highest possible material stiffness to the extruded material. The reaction in the form of a polymerization produces a 3D connected net that immediately reduces the fluidity of the construction material by a matrix effect and provides stiffness property that allow the extruded/printed material to support its own weight without deformation, keeping stable dimensions and geometries of parts/layers from the nozzle (see page 6, last paragraph, to page 7, second paragraph of the description of the present application).
- 2.4 The problem to be solved by the present invention may therefore be regarded as providing a formless production process ensuring a high production rate while providing for a radical change of the rheological properties of the fluid/plastic construction material between the state prior to the extrusion die or nozzle and the material exiting the die/nozzle.

- 2.5 None of the cited documents at hand discloses or suggests the solution as defined in claim 1:
- 2.6 D1 ([0114] and [0181]) discloses that ADMS1 consists of a polycarboxylic ether (PCE) and ADMS2 consists of a hardening accelerator.
- 2.7 D2 ([0025] and [0030]) discloses that ADMS1 consists of a plasticiser and ADMS2 consists of a hardening accelerator.
- 2.8 D3 ([0018]-[0024]) discloses the use of a redox pair in an additive manufacturing process, wherein the second component of the redox system (e.g., sodium bisulfite) is injected into the hose to become mixed with the settable composition and first component of the redox system (e.g., potassium persulfate) to activate polymerization of the monomer components in order to confer early age strength with desirable yield stress properties that need not depend upon the hydration reaction dynamics within the cementitious material. D3 achieves therefore the same technical effect but in an alternative way.
- 2.9 D4 (figure 1; [0073]) discloses that ADMS1 consists of a superplasticiser (such as modified polycarboxylic ethers (PCE), polynaphthalene sulfonates (PNS), polymelamine sulfonates (PMS), calcium, sodium or ammonium lignosulfonates (LS) and polyacrylates) and ADMS2 consists of a setting trigger (such as «alkaline» accelerators based on sodium or potassium silicate and «non-alkaline» accelerators based on aluminum sulphates or aluminum hydroxides).
- 2.10 Hence, the subject matter of claim 1 seems to involve an inventive step in the meaning of Art. 33(3) PCT.
- 2.11 The subject matter of claim 11 relates to the use of the construction material obtained by the process of claim 1, wherein said construction material is distinguishable from that of the prior art documents in said mechanical and chemical properties. Hence, the subject matter of claim 11 seems also to involve an inventive step in the meaning of Art. 33(3) PCT.

3 Dependent claims

- 3.1 The claims 2-10 depend on inventive claim 1 and seem therefore also to meet the requirements of the PCT in respect of novelty and/or inventive step.

4 Industrial applicability

- 4.1 The subject matter of claims 1-11 is considered as being industrially applicable (Article 33(4) PCT).

Re Item VII

- 5 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1 is not mentioned in the description, nor is this document identified therein.
- 6 The subject matter of claims 5 and 9 appears to be redundant with that of claim 1.
- 7 Claim 7 refers to "ADMS1-CB" first mentioned in claim 6 and is therefore dependent on said latter.
- 8 Claim 10 refers to itself.

Re Item VIII

- 9 The subject matter of claim 1 is broader than what is justified by the description of the present application. Indeed, the admixture systems defined in claim 1 are too broadly defined and encompass therefore many compounds that are not adequately supported by the description. In addition, it appears evident from the passage on page 6, last paragraph, to page 7, second paragraph of the description of the present application and from the examples given starting on page 10, that a first admixture system ADMS1 selected from PEO/PEG as defined in claim 4 and a second admixture system ADMS2 selected from naphthalene, anthracene, pyrene, phenanthrene, isoquinoline, chrysene as defined in claim 8 are essential for achieving the technical effect the present invention intends to achieve. The requirements stipulated under Art. 6 PCT are therefore not met.