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(54) Mould for casting concrete and method for making same

(57) A mould (1) for casting concrete is disclose. The mould has at least one wall (2) made of a sandwich structure, which comprises first and second reinforcement fabric layers (4a, 4b; 5a, 5b), which are arranged at respective surface portions (3a, 3b) of the sandwich structure, a polymer material matrix, in which the first and second reinforcement fabric layers (4a, 4b; 5a, 5b) are substantially enclosed, and a foamed core (3), arranged between the first and second reinforcement fabric layers (4a, 4b; 5a, 5b), The foamed core (3) is formed of the same material and in one piece with the polymer material matrix.

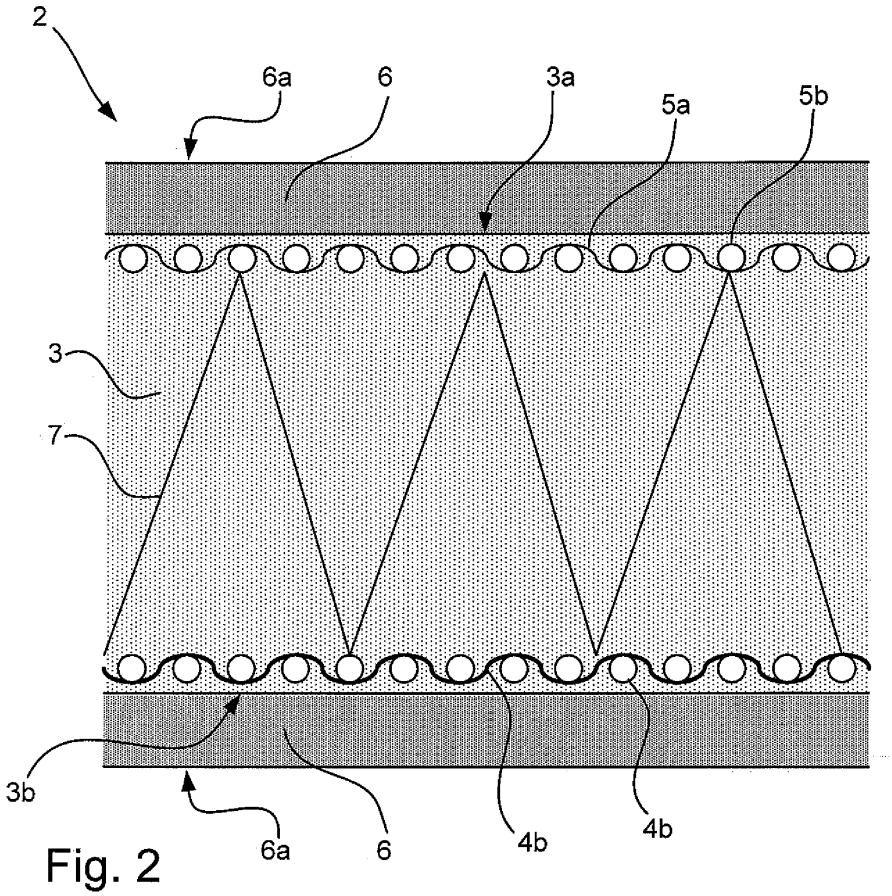

Fig. 2

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Description

Technical Field

[0001] The present disclosure relates to a mould for casting concrete, and to a method for making such a mould.

Background

[0002] In connection with casting of concrete structures, e.g. buildings, bridges, roads etc., there is frequently a need to provide a mould, in which the concrete is poured and allowed to set. After setting, the mould is generally removed. Such moulds is typically made of wood or wood-based materials, such as, plywood or chipboard, or even fibre boards (MDF, HDF etc.).

[0003] In order to reduce costs, it is desirable to reuse the mould material, preferably multiple times. Wood and wood based materials are, however, sensitive to moisture, which limits the number of times wood or wood-based mould materials may be reused. Furthermore, the density of wood and wood-based materials make moulds made of such materials heavy and thus cumbersome to handle.

[0004] Hence, there is a need for an improved or alternative mould, which could eliminate, or at least alleviate, the problems associated with the prior art moulds.

Summary

[0005] It is an object of the present disclosure, to provide a mould for casting concrete, which eliminates or alleviates the problems of prior art moulds.

[0006] The object is wholly or partially achieved by a mould and a method according to the appended independent claims. Embodiments are set forth in the appended dependent claims, and in the following description and drawings.

[0007] According to a first aspect, there is provided a mould for casting concrete, having at least one wall made of a sandwich structure. The mould wall comprises first and second reinforcement fabric layers, which are arranged at respective surface portions of the sandwich structure, a polymer material matrix, in which the first and second reinforcement fabric layers are substantially enclosed, and a foamed core, arranged between the first and second reinforcement fabric layers. The foamed core is formed of the same material and in one piece with the polymer material matrix.

[0008] A mould having such walls may be reused multiple times, as the wall material is substantially insensitive to moisture, and can be made very strong. Still, such a mould is relatively uncomplicated to produce on a large scale, and so a relatively low cost can be achieved.

[0009] The mould walls are thus made from an integrated sandwich board, i.e. a sandwich board, wherein a foaming core material is wetting respective reinforcing webs arranged at the surfaces of the board, since the foam collapses at the surface to form a fiber reinforced skin.

[0010] A spacing web may be immersed in the foamed core. This is a simple way of keeping the reinforcement fabric layers at a desirable distance during the production process. The spacing web may comprise a sheet of lofty material, having a thickness, which substantially corresponds to a thickness of the foamed core.

[0011] The mould wall may have a thickness of about 8 to about 30 mm. Specific embodiments include 11, 15, 19 and 25 mm wall thicknesses.

[0012] The mould wall may further comprise a facing sheet, which is made from a material other than that of the polymer material matrix.

[0013] Hence, the mould wall may be given any desirable appearance and/or structure.

[0014] The facing sheet may be integrated with the sandwich structure in connection with the forming of the sandwich structure. The facing sheet may e.g. be a thermoplastic material. In particular embodiments, the facing sheet may comprise at least one of thermoplastic olefin, ABS, PMMA and ASA, either as layers or as a co-polymer.

[0015] In the alternative, the the facing sheet may be made of a thermosetting polymer. In particular embodiments, the facing sheet may comprise at least one of melamine, urea and phenol or combinations or derivatives thereof.

[0016] The polymer matrix may comprise polyurethane, and/or a polyurethane derivative. Hence, any polymer based on urethane, or polymers having similar properties may be used.

[0017] According to another aspect, there is provided a method for producing a mould wall for a concrete casting mould. The method comprises arranging a first reinforcement fabric in a first wall mould part, arranging a second reinforcement fabric spaced from the first reinforcement fabric, dispensing an expanding polymer matrix forming material into the first wall mould part, providing a second wall mould part, and allowing the polymer matrix forming material to set so as to form a polymer matrix and a foamed core.

[0018] The method may further comprise arranging a spacing web on first reinforcement fabric. The method may further comprise pressing the first and second wall mould parts together.

[0019] The method may further comprise cutting the mould wall into a desirable size.

Brief Description of the Drawings

[0020]

Fig. 1 schematically illustrates a concrete mould.

Fig. 2 schematically illustrates a section of a part of a mould wall.

Description of Embodiments

[0021] Fig. 1 schematically illustrates a mould 1 for casting a concrete structure. Whereas the mould 1 illustrated in Fig. 1 is of a trivial shape, it is recognized that the mould of the present disclosure may have any shape.

[0022] The mould 1 comprises at least one wall 2 having a pair of opposing surfaces 3a, 3b. The mould walls may be attached to each other to form a mould structure using profile sections, which may be integrated into the mould wall elements, or using separate profile sections, to which the mould walls are attached. The mould walls 2 may be planar or curved.

[0023] Fig. 2 schematically illustrates a section of a part of a mould wall 2, intended to illustrate the construction of the mould wall.

[0024] The mould wall 2 comprises a core 3 of a foamed polymer material, such as e.g. polyurethane, polyurethane derivatives or similar materials. At the outermost portions of the mould wall, near its surfaces 3a, 3b, a respective reinforcement fabric layer 4a, 4b; 5a, 5b is provided. The reinforcement fabric layer may be formed by a woven or non-woven material, which may comprise reinforcing fibres of any desired type, such as e.g. glass fibres, carbon fibres, aramid fibres, hemp fibres, etc. In the illustrated embodiment, the reinforcement fabric is a woven fabric, having mutually orthogonal fibres 4a, 5a; 4b, 5b. For example, the material may be made by any combination of weaving, stitching, knitting and/or chopping.

[0025] The mould wall also comprises a low density spacing web 7, which may be in the form of a thee dimensional fiber material, typically having low weight/sqm. The spacing web may, but need not, have a reinforcing effect on the mould wall 2.

[0026] At one or both of its surfaces 3a, 3b, a facing sheet 6 may be arranged. The facing sheet may be of any desirable material, and may be used to provide a certain appearance and/or surface structure to a surface 6a of the mould wall 2. For example, the surface structure may provide a surface having improved release properties relative to concrete.

[0027] The mould wall 7 may be produced according to the following. A first reinforcement fabric 4a, 4b is arranged in a first part of a two-part mould. The first part of the two-part mould may be formed as a sheet with edges having a height corresponding to the desired thickness of the mould wall 2 to be produced therein.

[0028] A spacing web 7 may be arranged on top of the first reinforcement fabric 4a, 4b, and a second reinforcement fabric 5a, 5b is arranged on top of the spacing web 7. The spacing web may be formed of glass fibres, carbon fibres, aramid fibres, hemp fibres or any combination thereof.

[0029] A material forming the polymer material matrix and foamed core 3 is then dispensed into the first part of the two-part mould, for example in a fluid or viscous form, possibly as monomer or partially polymerized monomers.

[0030] A second part of the two-part mould is then positioned on top of the first part of the two-part mould, and the material is allowed to set. The second part of the two-part mould may be pressed against the first part of the two-part mould. Energy, in the form of heat and/or pressure, may be added, as desired, to enable or to speed up the setting process.

[0031] Selecting an appropriate material will provide a foamed core 3 and smooth surfaces 3a, 3b.

[0032] If a facing sheet 6 is desirable, it may be provided either at the bottom of the first part of the two-part mould, prior to the insertion of the first reinforcing fabric 4a, 4b, and/or it may be provided at the top of the first part of the two-part mould, subsequent to the insertion of the second reinforcing fabric 5a, 5b. The facing sheet may be reinforce by e.g. glass fibres, carbon fibres, aramid fibres, hemp fibres etc. The facing sheet may be embossed to provide a desired surface structure, or it may be smooth or have specific release properties.

[0033] The mould walls may be produced as large mould wall elements, which subsequently may be cut into appropriate size, or they may be given their final shape and size directly when produces.

Claims

1. A mould (1) for casting concrete, having at least one wall (2) made of a sandwich structure, the sandwich structure comprising:

   first and second reinforcement fabric layers (4a, 4b; 5a, 5b), which are arranged at respective surface portions (3a, 3b) of the sandwich structure,
   a polymer material matrix, in which the first and second reinforcement fabric layers (4a, 4b; 5a, 5b) are substantially enclosed, and
   a foamed core (3), arranged between the first and second reinforcement fabric layers (4a, 4b; 5a, 5b), wherein
   the foamed core (3) is formed of the same material and in one piece with the polymer material matrix.

2. The mould as claimed in claim 1, wherein a spacing web (7) is immersed in the foamed core (3).

3. The mould as claimed in claim 2, wherein the spacing web (7) comprises a sheet of lofty material, having a thickness, which substantially corresponds to a thickness of the foamed core (3).

4. The mould as claimed in any one of the preceding claims, wherein the wall (2) has a thickness of about 8 to about 30 mm.

5. The mould as claimed in any one of the preceding claims, wherein the wall further comprises a facing sheet (6), which is made from a material other than that of the polymer material matrix (3).

6. The mould as claimed in claim 5, wherein the facing sheet (6) is integrated with the sandwich structure in connection with the forming of the sandwich structure.

7. The mould as claimed in claim 5 or 6, wherein the facing sheet (6) is made of a thermoplastic material.

8. The mould as claimed in claim 7, wherein the facing sheet (6) comprises at least one of thermoplastic olefin, ABS, PMMA and ASA.

9. The mould as claimed in claim 5 or 6, wherein the facing sheet (6) is made of a thermosetting polymer.

10. The mould as claimed in claim 9, wherein the facing sheet comprises at least one of melamine, urea and phenol.

11. The mould as claimed in any one of the preceding claims, wherein the polymer matrix (3) comprises polyurethane, and/or a polyurethane derivative.

12. A method for producing a mould wall (2) for a concrete casting mould, comprising:

arranging a first reinforcement fabric (4a, 4b) in a first wall mould part,
arranging a second reinforcement fabric (5a, 5b) spaced from the first reinforcement fabric (4a, 4b),
dispensing an expanding polymer matrix forming material into the first wall mould part,
providing a second wall mould part, and
allowing the polymer matrix forming material to set so as to form a polymer matrix and a foamed core (3).

13. The method as claimed in claim 12, further comprising arranging a spacing web (7) on first reinforcement fabric (4a, 4b),

14. The method as claimed in claim 12 or 13, further comprising pressing the first and second wall mould parts together.

15. The method as claimed in any one of claims 12-14, further comprising cutting the mould wall (2) into a desirable size.

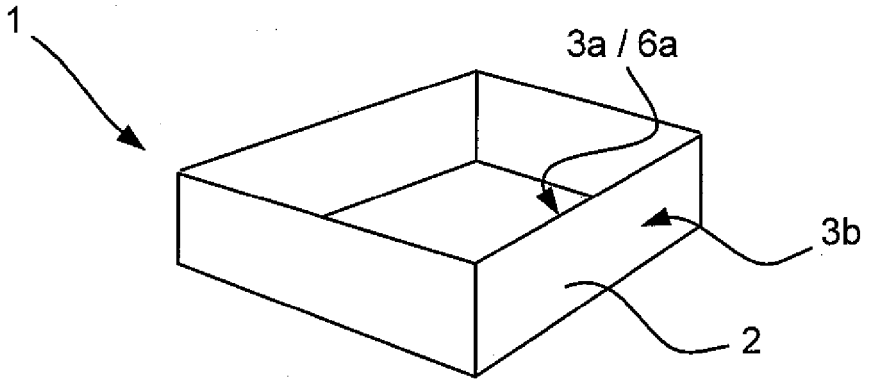

Fig. 1

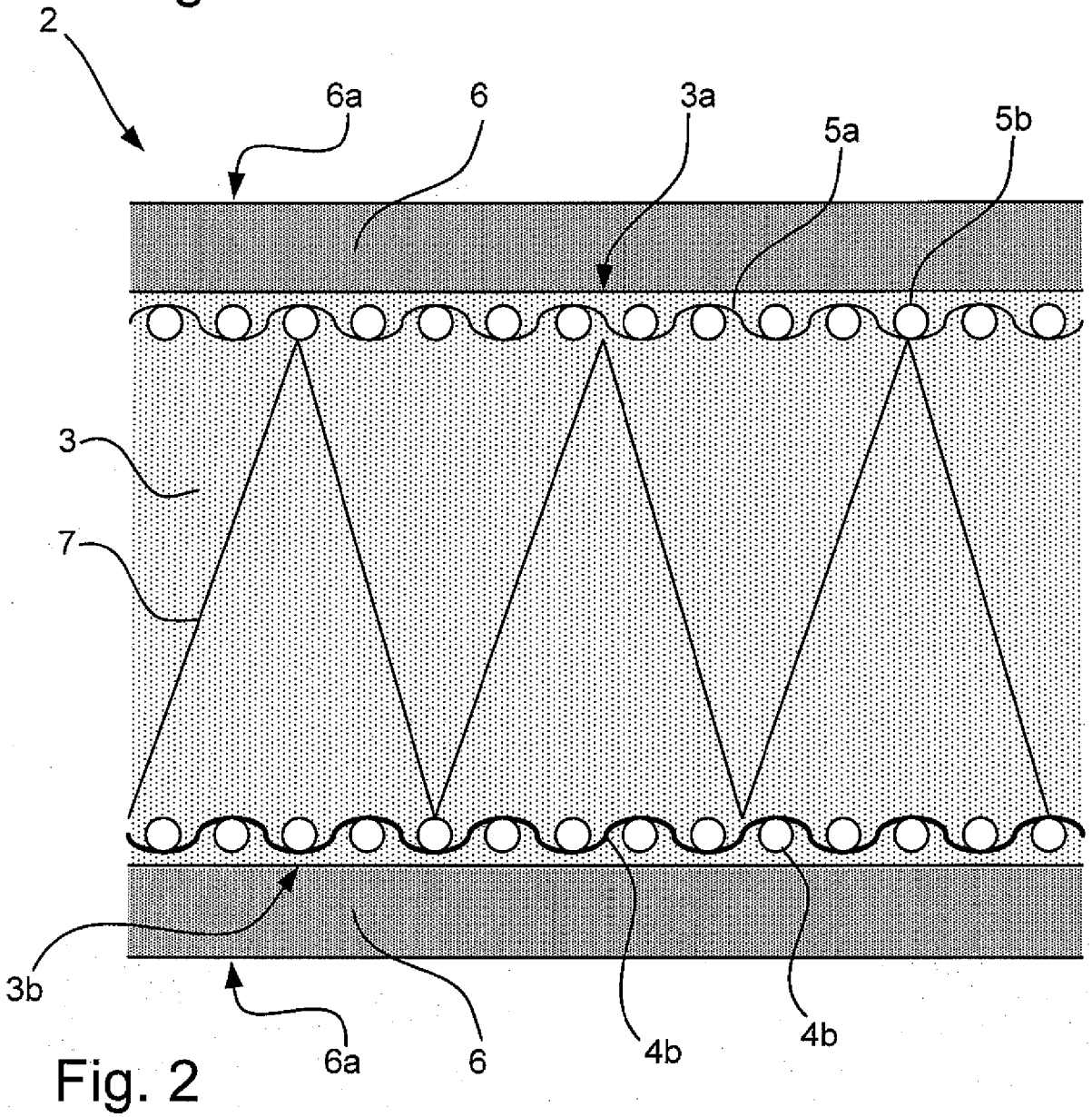

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 07 12 0814

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TECHNICAL FIELDS SEARCHED (IPC)

E04G
B32B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 April 2008	Saretta, Guido

CATEGORY OF CITED DOCUMENTS

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