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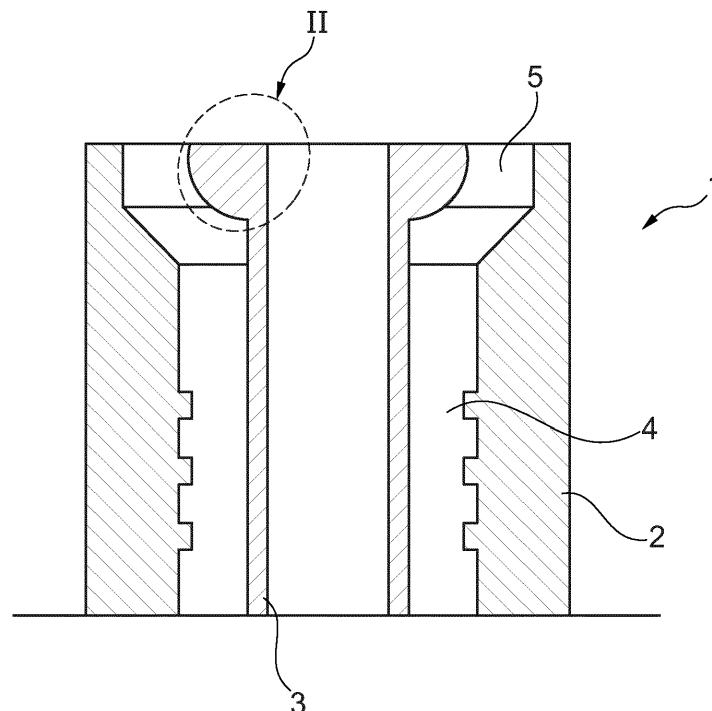
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(54) **Method and mould for casting a concrete tube**

(57) The invention relates to a method for casting a concrete tube (8), which method comprises the steps of:  
- providing an outer mould (2) and an elongate inner mould (3), wherein the inner mould (3) is arranged inside the outer mould (2);  
- pouring a concrete mixture in the mould space defined

by the inner mould (3) and the outer mould (2);  
- after pouring the concrete mixture leaving the concrete mixture to set;  
- pulling the inner mould (3) in axial direction out of the set concrete tube (8) and wherein the outer surface of the inner mould (3) is lined with a flexible layer (7).



**Fig. 1**

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## Description

**[0001]** The invention relates to a method for casting a concrete tube, which method comprises the steps of:

- providing an outer mould and an elongate inner mould, wherein the inner mould is arranged inside the outer mould;
- pouring a concrete mixture in the mould space defined by the inner mould and the outer mould;
- after pouring the concrete mixture leaving the concrete mixture to set.

**[0002]** It is known to cast concrete sewer tubes in moulds. These moulds are positioned vertically and a concrete mixture is poured into the mould. After the concrete is hardened the mould is removed. This is typically done by removing the inner mould by disassembling the mould into at least two parts. Also the outer mould is typically removed in at least two parts.

**[0003]** The mould parts are typically made of steel. During setting of the concrete mixture, the concrete will shrink somewhat, such that the set concrete tube will be arranged tightly around the inner mould, which will prevent the possibility of pulling the inner mould in axial direction out of the concrete tube. Therefore, the prior art teaches to use a partitioned inner mould, which can be disassembled after the concrete tube has set.

**[0004]** Disassembling of the inner mould and outer mould however takes time. Furthermore, the disassembled mould parts have to be reassembled for casting the next concrete tube.

**[0005]** It is an object of the invention to reduce or even remove the above mentioned disadvantages.

**[0006]** This object is achieved with a method according to the preamble, which method is characterized by:

- pulling the inner mould in axial direction out of the set concrete tube and wherein the outer surface of the inner mould is lined with a flexible layer.

**[0007]** By providing the outer surface of the inner mould with a flexible layer, it is possible to have some deformation of the mould surface compared to a steel mould surface. As a result it proves possible to pull out the inner mould as one piece, from the cast concrete tube.

**[0008]** Now, the inner mould can be pulled out in one piece, it is no longer necessary to disassemble and assemble the inner mould, providing a production time advantage.

**[0009]** A further advantage of the method according to the invention, is the finish of the interior wall of the concrete tube. The use of a flexible layer and then pulling out the inner mould in axial direction, provides a smoother surface compared to tubes manufactured according to the prior art.

**[0010]** Preferably, the inner mould has a substantially uniform cross section over the length of the mould. This

cross section is typical circular, but could also be ellipsoid, square or rectangular.

**[0011]** One end of the inner mould may be provided with a bulge having a releasable shape, such that the resulting concrete tube has a recess at the end for connection of a next tube part. The bulge needs to have a releasable shape, such that the inner mould still can be pulled out in axial direction.

**[0012]** In an embodiment of the method according to the invention the pulling force for pulling the inner mould out of the set concrete tube is supported on the outer mould.

**[0013]** By supporting the pulling force on the outer mould, the concrete tube is protected. If the concrete tube is just set, it is not at its maximum strength. Supporting the pulling force on the just set concrete tube could result in cracks or deformations in the tube.

**[0014]** Preferably, the outer mould is removed after the inner mould is removed. In this way, the outer mould can provide as a support for the pulling force, but also contribute to the strength of the tube, when the inner mould is pulled out. Any radial stresses on the tube occurring during the removal of the inner mould will be taken by the outer mould.

**[0015]** In a preferred embodiment of the method according to the invention, the flexible layer is a polyurethane layer. Polyurethane provides a smooth, scratch resistant surface. Furthermore polyurethane can be provided with a suitable stiffness, such that the static pressure of the liquid concrete mixture does not fully compress the flexible layer and such that sufficient flexibility is available when the inner mould is pulled out.

**[0016]** The invention also relates to a mould for casting a concrete tube, which mould comprises:

- an outer mould;
- an elongate inner mould arranged in the outer mould, wherein a mould space is defined by the outer mould and the inner mould;
- an end plate for closing off one end of the mould space;

wherein the outer surface of the inner mould is lined with a flexible layer.

**[0017]** Preferably, the flexible layer is a polyurethane layer.

**[0018]** These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a cross sectional view of an embodiment of a mould according to the invention.

Figure 2 shows an enlarged view of a detail of figure 1.

Figure 3 shows an enlarged view of a detail of figure 1, when the concrete has been poured.

Figure 4 shows part of the method steps according to the invention.

Figure 1 shows a cross sectional view of an embodiment of a mould 1 according to the invention. The mould 1 has an outer mould 2 and an inner mould 3. The inner mould 3 is arranged inside the outer mould 2, such that a mould space 4 is defined by the inner mould 3 and outer mould 2.

**[0019]** The outer mould 2 is provided at the top with a recess 5 in the inner wall. This recess 5 will provide a bell on the tube to be cast.

**[0020]** Figure 2 shows a detailed view of the inner mould 3. The inner mould 3 has a steel pipe 6, which is lined on the outer surface with a flexible layer, in particular a polyurethane layer 7. This polyurethane layer 7 provides for a smooth surface to the concrete tube.

**[0021]** A bulge 10 is provided at the top end of the mould 3 in the flexible layer 7 to provide a recess in the bell end of the concrete tube 8.

**[0022]** As depicted in figure 3, the flexible layer 7 also takes up any differences in dimensions due the shrink of setting concrete. The inner diameter of the concrete tube 8 will shrink somewhat during setting of the concrete. With conventional steel inner mould, this would result in a firm grip of the concrete tube on the inner mould. However, with the invention, the flexible layer 7 will be compressed, as depicted by the dashed line 9, by the shrinking concrete. This will reduce the grip of the concrete tube on the inner mould 3.

**[0023]** As result of the flexible, polyurethane layer 7, it is possible to pull the inner mould 3 out in axial direction from the set, concrete tube 8. (see figure 4) The pull force, to get the inner mould 3 out of the concrete tube 8 can be supported on the outer mould 2.

**[0024]** The bulge 10 of the inner mould will leave a recess 11 in the concrete tube 8. A bottom tube end can be seated in this recess 11 of a next concrete tube 8 and will enable the connection of a number of concrete tubes 8 to provide a pipe line.

**[0025]** After the inner mould 3 has been pulled out, or at least pulled out sufficiently, the outer mould 2 can be removed from the tube 8. Typically, the outer mould 2 is disassembled into for example two parts.

the set concrete tube and wherein the outer surface of the inner mould is lined with a flexible layer.

5    **2.** Method according to claim 1, wherein the pulling force for pulling the inner mould out of the set concrete tube is supported on the outer mould.

10    **3.** Method according to claim 1 or 2, further comprising the step of:

- after removing the inner mould, removing the outer mould.

15    **4.** Method according to any of the preceding claims, wherein the flexible layer is a polyurethane layer.

20    **5.** Mould for casting a concrete tube, which mould comprises:

- an outer mould;  
- an elongate inner mould arranged in the outer mould, wherein a mould space is defined by the outer mould and the inner mould;  
- an end plate for closing off one end of the mould space;

**characterized in that**

the outer surface of the inner mould is lined with a flexible layer.

30    **6.** Mould according to claim 5, wherein one end of the inner mould is provided with a bulge having a releasable shape.

35    **7.** Mould according to claim 5 or 6, wherein the flexible layer is a polyurethane layer.

## Claims

**1.** Method for casting a concrete tube, which method comprises the steps of:

50    - providing an outer mould and an elongate inner mould, wherein the inner mould is arranged inside the outer mould;

- pouring a concrete mixture in the mould space defined by the inner mould and the outer mould;

55    - after pouring the concrete mixture leaving the concrete mixture to set;

**characterized by**

- pulling the inner mould in axial direction out of

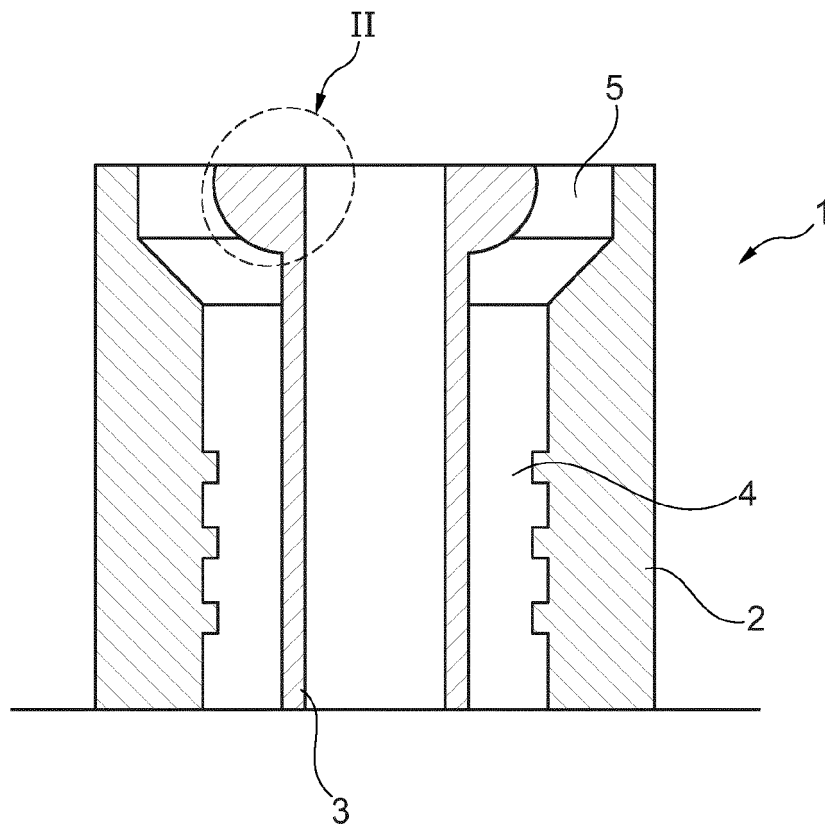


Fig. 1

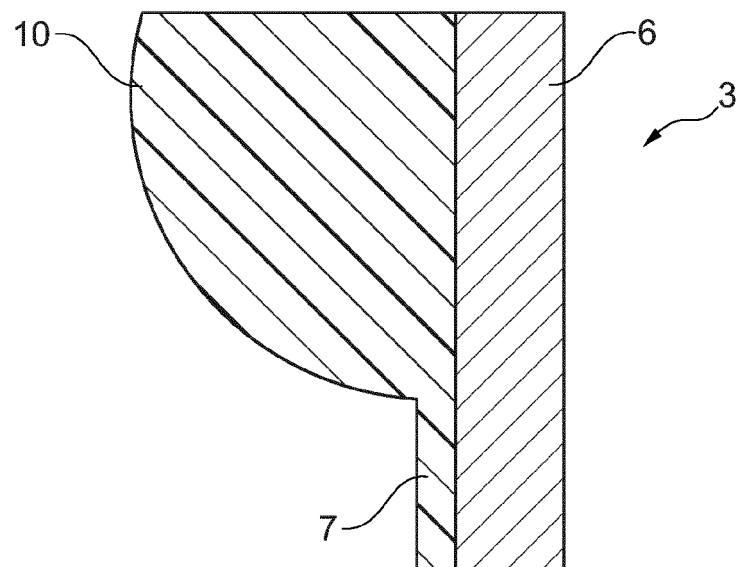


Fig. 2

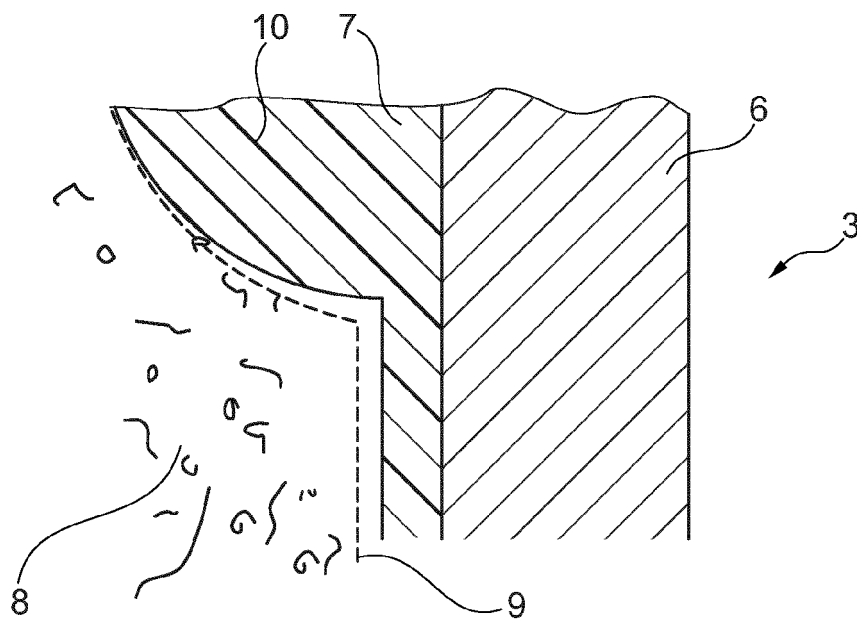


Fig. 3

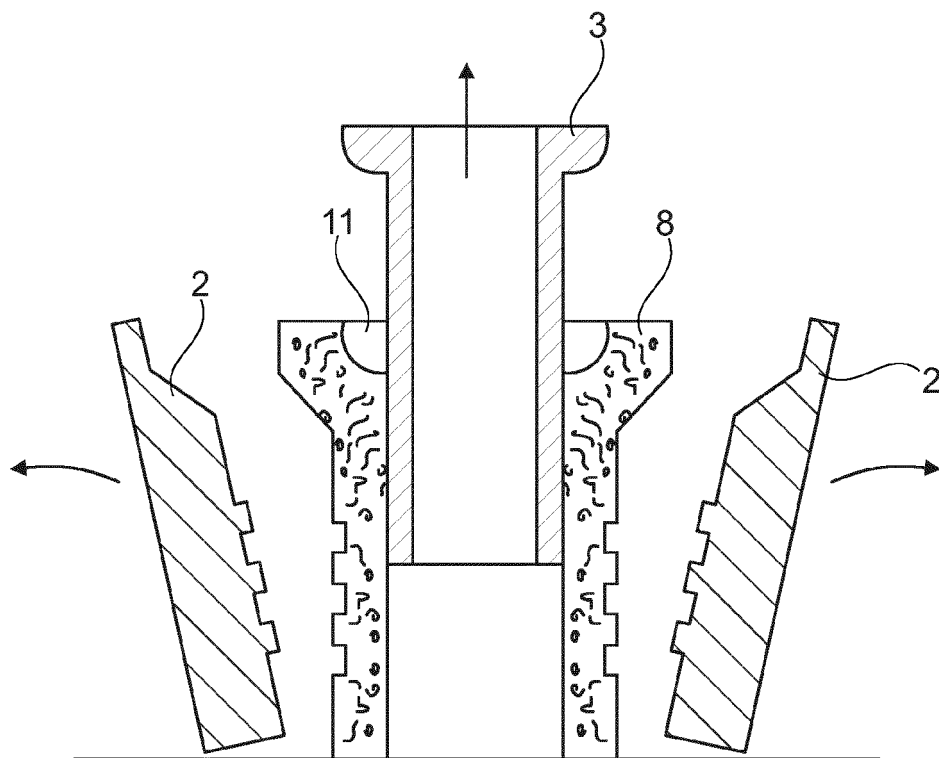


Fig. 4



## EUROPEAN SEARCH REPORT

Application Number  
EP 13 17 4910

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 November 2013	Examiner Voltz, Eric
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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