

P 1718

- 1 -

Anchor of composite form

The invention relates to an anchor of composite form, comprising an anchoring rod and a crushable cartridge filled with the two components of a hardenable bonding agent, according to the preamble of claim 1.

A cartridge known from EP-A-502 348 for an anchor of composite form has a mineral mortar as one component and water as its other component, which is located in an inner container comprising container sections that are distributed along the length of the cartridge and are individually crushable as the anchoring rod is driven in. With this distribution of the water component over the entire length of the cartridge, the mortar ought to be uniformly saturated with water and a good mixing and ideal hardening ought to be achieved. The known solution provides an inner container of very complicated construction and several uniformly distributed small containers for filling with water, which in some cases still have to be distributed in the cartridge with the aid of positioning means. Despite this very complicated configuration of the known cartridge, it is nevertheless impossible to prevent an uneven distribution of the water component and some of the water escaping, at least as the anchoring rod is put into position. As a consequence, the bonding agent is incompletely mixed, which is to be expected with bores running horizontally but is even more marked in overhead installations. The holding values of the anchoring rod are therefore extremely inconsistent, and present a corresponding safety risk.

The invention is based on the problem of improving an anchor of composite form of the kind mentioned in the introduction to allow uniform mixing of the bonding

agent in any position of the drilled hole combined with a simple configuration of the inner container.

According to the invention, this problem is solved by the features given in claim 1. The thixotropic agent in the water component renders the latter paste-like, so that when the cartridge is crushed the water component is unable to escape regardless of the way the drilled hole runs. The shear forces generated by the rotating anchoring rod as it is inserted in the drilled hole liquefy the water component commensurate with the advancement of the anchoring rod, so that the bonding agent is uniformly impregnated and mixed. Both the powder-form mortar and the water are bonded in the paste-like mixture so that there is no need to fear escape of one of the two components from the drilled hole as the mixing process is taking place, even in the case of overhead installation. Homogeneous mixing of the two components produces high holding forces of the anchoring rod once the bonding agent has hardened.

The use of inorganic substances both for the cartridge and for the two components of the bonding agent creates an ecologically safe product which also meets all fire safety requirements. Moreover, a simple glass cylinder closable by fusion can be used as the inner container, so that the entire anchoring cartridge can be manufactured at reasonable cost.

Amorphous, pyrogenic silicic acid has proved especially suitable as a thixotropic agent, which is admixed with the water component in a proportion of 0.5 % to 2 %. To ensure uniform distribution of the water component during the mixing process it is advisable to fill the inner container with the water component and to match the length of the inner container to the length of the inner space of the cartridge.

In combination with the cartridge according to the invention, it is furthermore expedient to use an anchoring rod which, at its end facing the drilled hole, has an expander cone widening towards the end and surrounded by an anchoring sleeve that is expanded by means of the expander cone. In the event of tensile stress acting on the anchoring rod, the expander cone is drawn into the anchoring sleeve fixedly bonded into the drilled hole, so that additional expansion forces are generated at the bottom of the drilled hole through the expander cone arranged on the anchoring rod. Consequently, only compression forces act on the core of mortar which has hardened in the drilled hole, which contribute to an increase in the holding values, in particular in the case of cracked concrete. The anchor of composite form according to the invention is therefore suitable for use in zones subject to tensile forces.

The invention is explained in detail with reference to an embodiment illustrated in the drawing.

The cartridge 3 made of glass is positioned in the drilled hole 1 of the component 2. In the cartridge 3 there is an inner container 4, likewise made of glass, which is approximately the length of the outer cartridge 3. In the inner container 4 there is the water component 5, which has been thickened to form a paste with a thixotropic agent, for example amorphous, pyrogenic silicic acid. This is achieved by a proportion of silicic acid of 0.5 % to 2 %. The outer cartridge is filled with mineral mortar 6 as the second component of the bonding agent. Both cartridges are closed by fusion of their open end.

Crushing of the two cartridges and release of the components of the bonding agent is effected by the anchoring rod 7, which for that purpose has a wedge-shaped tip 8. The anchoring rod 7 screwed into the

drilled hole with a drill machine generates shear forces which liquefy the water that has been rendered thixotropic commensurate with the advance of the anchoring rod. A paste-like mixture of the bonding agent is therefore produced immediately, which prevents escape, particularly of the water component. It is therefore possible to use the anchor of composite form even for overhead installation.

The anchoring rod 7 is screwed in almost to the bottom of the drilled hole, so that the entire cartridge is crushed and the components of the bonding agent are thoroughly mixed with the glass splinters of the two cartridges. After the bonding agent has hardened, the anchoring rod 7 is fixedly bonded in the drilled hole 1 of the component 2.

The anchoring rod 7 illustrated in the embodiment has a reduced portion 9 adjoining which, at the end facing the drilled hole, is an expander cone 10. This expander cone 10, and also the reduced portion 9, are surrounded by an anchoring sleeve 11 consisting of, for example, plastics material. The anchoring sleeve 11 has longitudinal grooves 12 and, at relatively large intervals, circumferential grooves 13 to improve bonding in the drilled hole. A tensile force acting on the anchoring rod 7 after it has been anchored draws the expander cone 10 into the anchoring sleeve 11, in particular when the drilled hole has widened as a result of cracks forming, so that expansion forces acting additionally on the anchoring sleeve 11 occur. These expansion forces press the anchoring sleeve against the wall of the drilled hole and the hardened core of bonding agent, thus compensating for widening of the drilled hole and reinforcing the holding force. The special configuration both of the cartridge and of the anchoring rod renders the anchor of composite form

- 5 -

according to the invention suitable for fixings in
zones subject to tensile forces.

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

- 6 -

fischerwerke

Artur Fischer GmbH & Co. KG

D-7244 Waldachtal

10.11.1992

JU/MI

P 1718

Patent Claims

1. An anchor of composite form, comprising an anchoring rod and a crushable cartridge filled with the two components of a hardenable bonding agent, in which the one component is a mineral mortar and the other component is water, both of which are separated from one another by a similarly crushable inner container and are mixed by means of the anchoring rod in order to fix the latter in the drilled hole, characterized in that the water component (5) is made up with a thixotropic agent so that it is paste-like unless subjected to shear forces.

2. An anchor of composite form according to claim 1, characterized in that the thixotropic agent is amorphous, pyrogenic silicic acid, which is admixed with the water component (5) in a proportion of 0.5 % to 2 %.

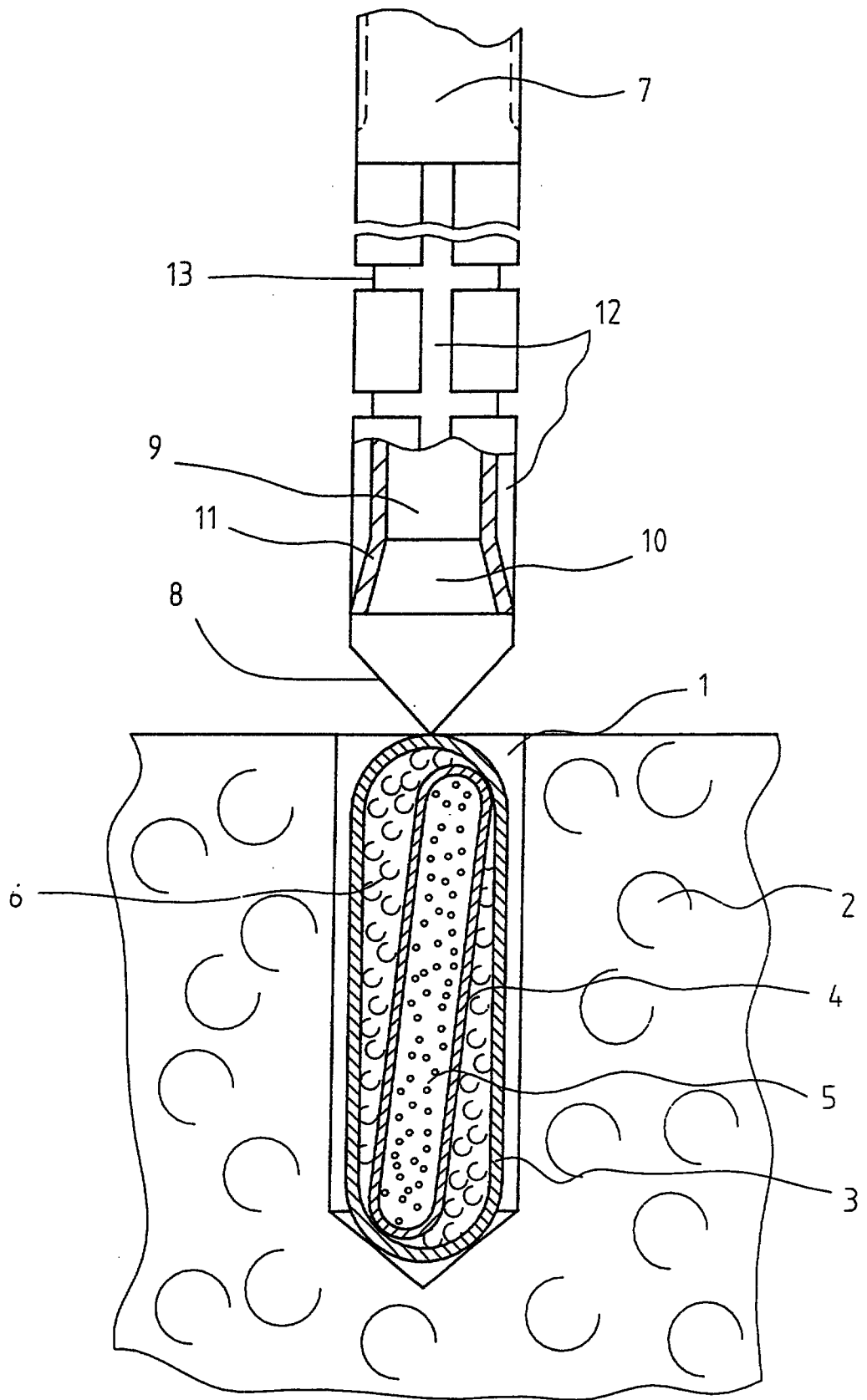
3. An anchor of composite form according to claim 1, characterized in that the water component (5) fills the inner container (4) which corresponds approximately to the length of the inner space of the cartridge (3).

4. An anchor of composite form according to claim 1, characterized in that the anchoring rod (7), at its end facing the drilled hole, has an expander cone (10) widening towards the end and surrounded by an anchoring sleeve (11) that is expanded by means of the expander cone.



* C L M S *

1/1



P 1718

Abstract

Anchor of composite form

An anchor of composite form for fixing an anchoring rod in a drilled hole is disclosed, in which the cartridge is filled with a mineral mortar as one component and with an inner container containing the water component. To achieve a uniform and homogeneous mixing of the two components, the water component is made up with an thixotropic agent so that is paste-like unless subjected to shear forces.

(Figure 1)

This Sheet Has Been Replaced



REPLACEMENT SHEETS SG

☐ Description : paged to paged

☐ Claim(s) : paged to paged

☐ Drawing(s) : paged to paged

☒ Abstract : paged to paged ^{1 page}

21 Nov 97

DATE OF RECEIPT ~~16 FEB 1997~~

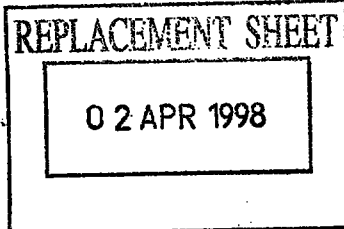
ABSTRACT

93115080.9

An anchor of composite form for fixing an anchoring rod (7) in a drilled hole (1) is disclosed, the cartridge (3) being filled with a mineral mortar (6) as one component and with an inner container (4) containing the water component (5). In order to achieve a uniform and homogeneous mixing of the two components, the water component (5) is adjusted with a thixotropic agent such that the water component is paste-like unless subjected to shear forces.

This is the replacement sheet

Date: 21 NOV 1997



- 6 -

Substitute Sheet
(31 March 1998)

Patent Claims

1. An anchor of composite form, comprising an anchoring rod and a crushable cartridge filled with the two components of a hardenable bonding agent, in which the one component is a mineral mortar and the other component is water with viscosity-increasing additives, both of which are separated from one another by a similarly crushable inner container and are mixed by means of the anchoring rod in order to fix the latter in the drilled hole, characterized in that the water component (5) is made up with the addition of amorphous, pyrogenic silicic acid as the thixotropic agent so that it is paste-like unless subjected to shear forces.
2. An anchor of composite form according to claim 1, characterized in that the thixotropic agent is admixed with the water component (5) in a proportion of 0.5 % to 10%, preferably 0.5 % to 2%.
3. An anchor of composite form according to claim 1, characterized in that the water component (5) fills the inner container (4) which corresponds approximately to the length of the inner space of the cartridge (3).
4. An anchor of composite form according to claim 1, characterized in that the anchoring rod (7), at its end facing the drilled hole, has an expander cone (10) widening towards the end and surrounded by an anchoring sleeve (11) that is expanded by means of the expander cone.
5. An anchor of composite form according to claim 1, characterized in that the thixotropic agent is



- 7 -

Substitute Sheet
(31 March 1998)

amorphous, pyrogenic silicic acid which is admixed with the water component (5) in a proportion of 0.5 % to 10%.

REPLACEMENT SHEET

02 APR 1998