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INJECTION SYSTEM FOR SEALING JOINTS IN CONCRETE STRUCTURES**BACKGROUND OF THE INVENTION****Field of the invention**

The present invention relates to an injection system for the sealing of joints in concrete or similar structures, such joints resulting e.g. from stepwise concrete casting. In particular, but not exclusively, the invention finds its use for the sealing of joints in the transition between a foundation sole and a foundation wall.

Background

It is commonly known that cracks, crevices etc. may occur in concrete structures, in particular in connection with joints resulting from stepwise concrete castings. These cracks and crevices are, by way of example, caused by lack in homogeneity or other consistency deficiency in the concrete or as a result of the setting shrinkage of the concrete, and may lead to penetration of water.

In order to repair such crack and crevice damages to the concrete and to achieve sealing of the concrete against penetration of water, suggestions have been made to effect a point by point injection of a sealing material, e.g. in the form of a polymer. Other injection materials which may be used for this purpose are polyurethanes, epoxies, acryl gels and micro-cements. There are also several suggestions for injection tubes or hoses which are to be cast-in into the concrete to permit a subsequent injection of sealing material or which may be placed along a joint face of an already cast section of the structure, e.g. on a foundation sole, prior to the casting of the subsequent section, e.g. a foundation wall. Examples of such injection tubes or hoses are disclosed in US 4.449.713 and 4.499.925, EP 0.125.696 and 0.501.004 and PCT/NO92/00044.

SUMMARY OF THE INVENTION

The present invention is aimed at an injection system for the sealing of joints in concrete structures having joint surfaces arising from stepwise casting of such structures and extending between an outer or upper side which may be under water pressure and an inner or lower side, for the purpose of preventing penetration of moisture from the water pressure side, whereby the placing of the system becomes substantially simpler and safer and whereby the effect becomes substantially enhanced. The characteristic features of the injection system of the invention are primarily that it comprises

- a) a per se known profile having a lengthwise through injection passage with an opening to that side of the profile which is to face the joint surface, in combination with
- b) a per se known swelling material attached to the profile on that side thereof which is to face the water pressure side of the concrete structure, and that
- c) the swelling material is disposed along the full length of the profile and around at least one of the end faces of the profile.

Further features of the invention will appear from the patent claims attached hereto.

BRIEF DESCRIPTION OF THE DRAWING

The invention is described in the following with reference to the accompanying drawing.

Figs. 1, 2 and 3 are cross-sections through three alternative embodiments of a profile for use in an injection system according to the present invention.

Fig. 4 illustrates schematically a laying pattern for profile units in an injection system in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

According to the invention, an injection system for the sealing of joints in concrete structures comprises a longitudinal profile 1 having a lengthwise passage 3 with an

opening 4,5 to that side of the profile 1 which is to face a joint surface 6 in the concrete structure. The joint surface 6 extends from an outer or upper side of the concrete structure, which side is or may be under water pressure, and an opposite, i.e. inner or lower side of the concrete structure, which is to be the "dry" side. Along this side the profile 1 is provided with a lip or flange 7 along one side edge, intended to engage with the joint surface 6 and to be on that side of the profile which is to face the dry side of the concrete structure. On that side of the profile 1 which is to face the water pressure side of the concrete structure, a swelling material is attached, in the form of "sausages" 8 (Fig. 1) or strips 9 (Figs. 2, 3). Conveniently, the profile 1 is provided with a lengthwise lip or flange 10 to cover at least part of the top side of the swelling material 8,9. The swelling material 8,9 is attached to the profile 1 by means of a suitable adhesive and/or by means of hooks or barbs 11 (Fig. 2) or by being retained by flanges 12 (Fig. 1) or similar devices. As appears from Fig. 4 the swelling material 8,9 is disposed along the full length of the profile 1 and around one end of the profile. It is, however, within the scope of the invention to dispose the swelling material around both ends of the profile. The swelling material 8,9 will, when subjected to moisture, swell so as to be almost 100 % impenetrable to moisture.

A sealing material, e.g. in the form of a polymer, is supplied to the passage 3 through inlet and outlet hoses 13 (fig. 4), the sealing material flowing from the passage 3 through the slot 4 and the widened portion 5 and further to cracks and crevices in the concrete. To prevent concrete material from a subsequent casting to penetrate along the joint surface 6 and into the widened portion 5 and further into the slot 4, thereby blocking the injection material from penetrating out to the cracks and crevices, a "sausage" (not shown) is conveniently provided in the widened portion 5, which "sausage" is of a throughout porous material. This "sausage" will also, together with the lip or flange 7, secure that the whole

arrangement according to the invention achieves a full through-out engagement with the joint surface 6, undisturbed by possible roughnesses in said surface. It is within the scope of the invention to form the profile with the slot 4 from the passage 3 directly to the underside of the profile, without the widened portion providing space for a porous "sausage" preventing concrete mass from penetrating into the slot 4 and the passage 3.

In previously known systems for injection sealing of joints in concrete structures, the injection profiles are installed with an overlapping and a sidewise spacing of the respective profile unit ends and the swelling "sausages", if and when used in conjunction with the injection profiles, are installed in a separate operation as a continuous strand spaced from the injection profiles. Thus, in these previously known systems, there are in fact two separate systems being used, with separate stock-keeping, installment patterns and installment operations for the profiles and swelling strands, respectively. For the present invention, the profile 1 and the swelling material 8,9 attached thereto as well as the inlet and outlet hoses 13 are conveniently delivered, stocked and installed as units, e.g. having lengths of 3 or 6 meters, and are installed in such a manner that the swelling material 8,9 provides a continuous barrier along the installed profiles. This is achieved by the adjoining units being installed with an overlapping of their ends and with minimal sidewise spacing, e.g. as shown in Fig. 4, whereby the swelling material 8,9 on one unit engages tightly with the swelling material on the adjacent unit.

CLAIMS

1. Injection system for the sealing of joints in concrete structures having joint surfaces arising from stepwise casting of such structures and extending between an outer or upper side which may be under water pressure and an inner or lower side, for the purpose of preventing penetration of moisture from the water pressure side, characterised in that it comprises

- a) a per se known profile (1) having a lengthwise through injection passage (3) with an opening (4,5) to that side of the profile which is to face the joint surface (6), in combination with
- b) a per se known swelling material (8,9) attached to the profile on that side thereof which is to face the water pressure side of the concrete structure, and that
- c) the swelling material (8,9) is disposed along the full length of the profile (1) and around at least one of the end faces of the profile.

2. Injection system according to claim 1, characterised in that the opening (4,5) from the injection passage (3) is in the form of a continuous slot (4) opening into a widened portion (5) adapted to receive a porous barrier against the intrusion of concrete mass to the injection passage.

3. Injection system according to claims 1 or 2, characterised in that the profile (1), on that side thereof which is to face the joint surface (6), is provided with a lip or flange (7).

4. Injection system according to claim 1 to 3, characterised in that the profile (1) on that side thereof which is to face away from the joint surface (6) and on that side which is to face towards the water pressure side of the concrete structure, is provided with a lip or flange (10) for the protection of the swelling material (8,9) against mechanical influence from above.

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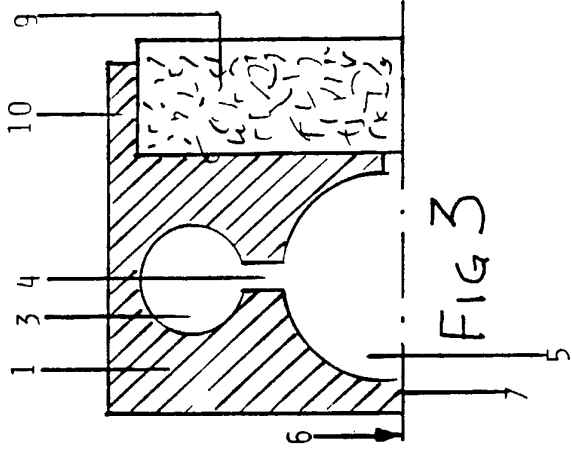
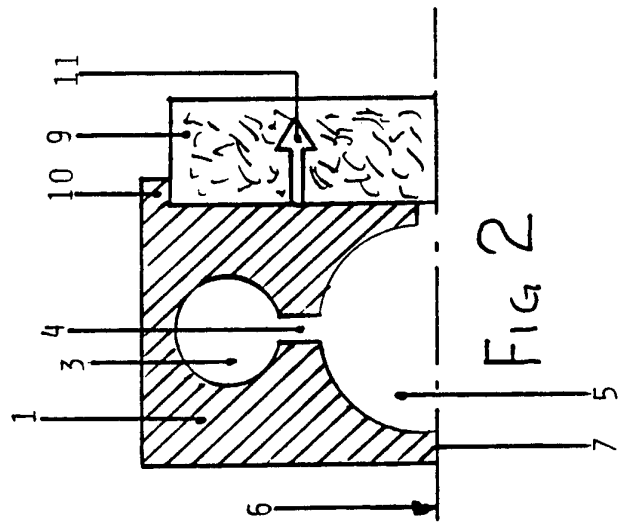
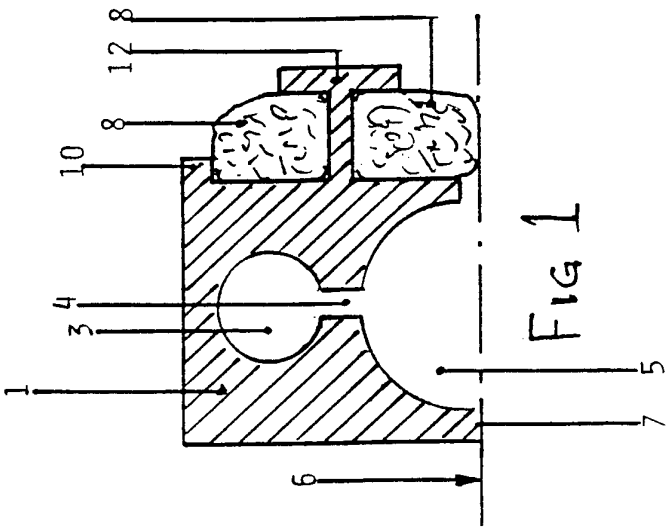


FIG 3

FIG 2

FIG 1

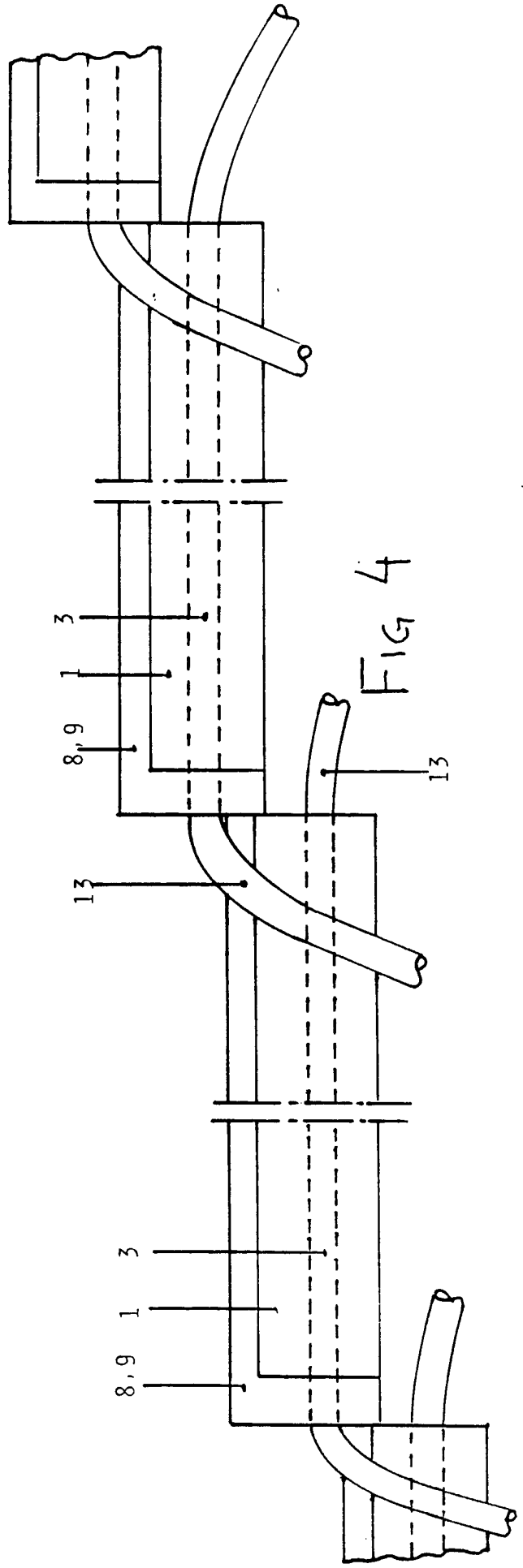


FIG 4

INTERNATIONAL SEARCH REPORT

Intern: 1 Application No

PCT/NO 94/00013

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 E02D29/16

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 E02D E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 418 699 (SCHMID) 27 March 1991 see column 1, line 1 - column 2, line 34	1-3
A	see column 13, line 40 - column 16, line 30; figures 1,2,5,6 ---	4
Y	US,A,4 449 713 (ISHIDO & TANAKA) 22 May 1984 cited in the application see abstract	1-3
A	see column 10, line 63 - column 11, line 2 see column 12, line 1 - column 13, line 37; figures 7-10,20-24 ---	4
A	EP,A,0 501 004 (C.I.KASEI CO. LTD. & PAUS A/S) 2 September 1992 cited in the application see the whole document -----	1

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search

17 May 1994

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NO 94/00013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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