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(54) PCB Removal

(57) The present invention relates in a first aspect to a method for removing a noxious substance from a joint (1) between adjacent building elements (2) and from the adjacent building elements (2), the joint extending along a depth axis (DA) between a front face (3) of at least one of the building elements and a rear face (4) of at least one of the building elements, the method comprising the steps of: providing one or more sealing elements (8, 9) at the joint forming a space (12) at and/or at least partially in the joint, providing an air moving means (13), providing a first interface (14) with the space allowing fluid communication between the space and the air moving means, and providing a second interface (17) with the space allowing fluid communication between the space and the ambient (16)

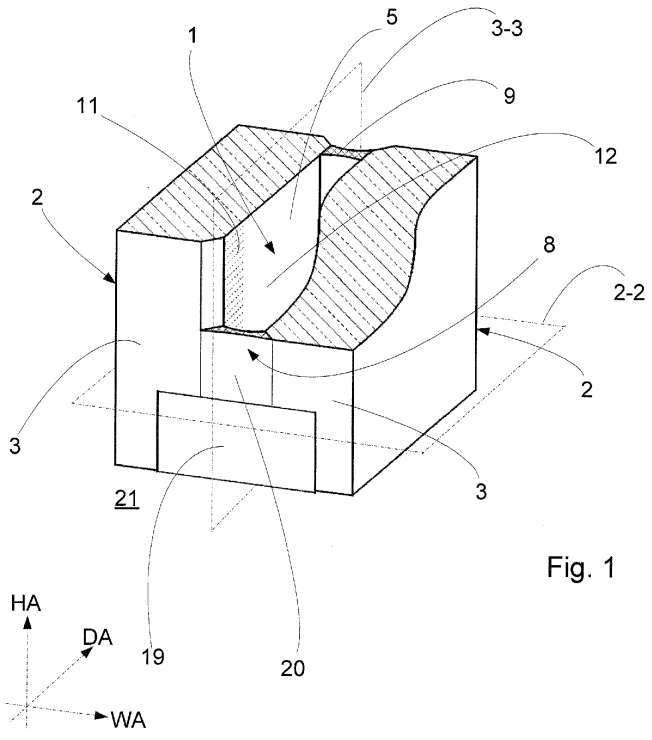

Fig. 1

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Description

[0001] The present invention relates in a first aspect to a method for removing a noxious substance, such as polychlorinated biphenyl (PCB), from a joint between adjacent building elements and from the adjacent building elements. In a second aspect, the present invention relates to a kit of parts for performing such a method. In another aspect the invention relates to a system for removing a noxious substance in the method of the invention.

[0002] In the context of the invention a "noxious substance" is any substance that can migrate from a material, e.g. a filler, a building element or the like, into the air surrounding the building element and thereby pose a risk to people exposed to the air.

[0003] Throughout this specification, the term "joint" denotes the actual gap between adjacent building elements.

[0004] Throughout this specification, the term "building element" comprises any type of building element, such as concrete or wooden wall elements, window frame elements, door frame elements, floor elements, beams, pillars or brickwork and any combination thereof.

[0005] Throughout this specification, orientation terms such as upper, lower, front, rear, in front of, behind etc. refer to the orientation in the appended Fig. 1.

[0006] A source of contamination of a joint between building elements is typically a filler at the joint containing a noxious substance, such as PCB. A typical PCB-containing filler material is caulking material used in windows, door frames, and masonry columns, and other building materials in the period between the 1950'ies and 1970'ies; in this period PCB's were widely used as plasticisers in caulk. With time, the noxious substance migrates from the filler into the ambient and into any air at the joint and into surrounding structures, such as building elements, insulation material, wallpaper, paint etc. - typically several millimetres into the immediate surroundings. As the noxious substance gets accumulated in these surrounding structures, they become sources of contamination as well, from which the noxious substance will diffuse into the ambient and into any air in the joint - even if the noxious substance-containing filler is removed. This diffusion of noxious substance is particularly problematic, when it diffuses into an indoors environment.

[0007] Various methods for removal of a noxious substance from a joint and its surrounding structures are known. DE 101 53 548 C1, for instance, discloses a method, wherein firstly a PCB-containing filler is cut away manually and removed from a joint. Then a sealing device is inserted at a position behind the removed filler. Next, filler residues at the joint are removed by means of a high-pressure water jet together with a part of the surrounding building elements so as to remove all sources of contamination.

[0008] Several problems are associated with this method for removal of PCB from a joint. One being that a large quantity of contaminated demolition waste is produced, since not only the PCB-containing filler but also part of the surrounding building elements are cut away and must be disposed of as contaminated waste. Also an amount of contaminated water must be disposed of.

[0009] Yet another problem is that it is hard to avoid that spray from the high pressure water jet gets thrown from the joint and its surroundings back out onto the operator and into the ambient, which may be an indoors environment. Hence, strict precautionary measures must be taken so as to protect the operator. Also, if the joint faces an indoors environment, it is necessary to appropriately seal off the room concerned. This means that during the PCB-removal process, the room is unavailable and unfit for inhabitance or other use.

[0010] Another problem is that due to the removal of material from the building elements surrounding the joint, the joint will be larger after the method has been performed. This necessitates an increased use of filler after the PCB-removal process and may also give rise to a less appealing overall appearance. In case of a joint facing an indoors environment, the rebuilding comprising insertion of new filler etc. also prolongs the time, wherein the room is unfit for stay or use.

[0011] DE 42 12 109 discloses a device for removing contaminated material such as asbestos or PCB-containing material from brickwork joints. The device is a glove box for air tight mounting on a wall containing a joint with a contaminated material. The box has an air outlet for connecting a freely movable vacuum hose and it may have an air inlet for supplying pressurised air to a compressed air-driven tool via a freely movable hose. The device allows for removal of material released using the compressed air-driven tool. The device cannot be operated in a non-destructive manner, A similar device is described in DE 43 37 114, which however is barely suited for removing noxious substances that migrate into the air.

[0012] On this background, it is an object of the present invention to overcome or mitigate at least some of the above-mentioned problems of the prior art.

[0013] With respect to the first aspect of the invention, this object is obtained by a method for removing a noxious substance, such as PCB, from a joint between adjacent building elements, such as concrete wall elements, and from the adjacent building elements, the joint extending along a depth axis between a front face of at least one of the building elements and a rear face of at least one of the building elements, the method comprising the steps of: providing one or more sealing elements at the joint forming a space at and/or at least partially in the joint, providing an air moving means, such as an air pump, providing a first interface with the space allowing fluid communication between the space and the

air moving means, and providing a second interface with the space allowing fluid communication between the space and the ambient, the respective interfaces being so positioned in relation to the space and to each other as to allow an air flow through the space, and applying an air flow through the space by means of the air moving means so as to provide a change of air in the space until an acceptable level of noxious substance in the joint and the surroundings is reached.

[0014] The "acceptable level" may be any concentration of the noxious substance which is found not to be a health risk to people exposed to the air surrounding the joint and the adjacent building elements. The acceptable level is dependent on the identity of the noxious substance, and for PCB exemplary values are below 400 ng/m^3 or below 300 ng/m^3 or lower. The concentration of the noxious substance in the air surrounding the joint and the adjacent building elements may be monitored in the method of the invention to indicate that the acceptable level has been reached.

[0015] The one or more sealing elements are so positioned as to allow a diffusion of noxious substance from the joint's immediate surroundings, such as the adjacent building elements and/or noxious substance-containing filler, into the space.

[0016] The noxious substance present in the air in the space is transported out of the space together with the air by the air change. Thereby the concentration of the noxious substance in the space is lowered. This causes a continued, or even increased, diffusion of the noxious substance from the adjacent building elements into the space, wherefrom the noxious substance-containing air is removed. The process may go on until an acceptable level of noxious substance in the joint and surroundings is reached and/or until an acceptable extent of diffusion from the contaminated joint and surroundings is reached. In this context the "surroundings" especially refer to the ambient air, e.g. air in a room defined by the building elements, but it may also refer to the building elements immediately surrounding the joint.

[0017] Thus, the method according to the first aspect of the invention provides for a non-destructive and gentle removal of the noxious substance from the contaminated joint's immediate surroundings, i.e. the method does not require the removal of the building elements or parts of the building elements. This is beneficial with regard to minimising the amount of contaminated waste produced during removal of the noxious substance. It is also beneficial as to the joint not being expanded during the process, which saves filler material for the reconstruction as well as enables the overall appearance of the joint and immediate surroundings to be substantially unchanged relative to before the noxious substance-removal process was initiated.

[0018] In an embodiment, the respective interfaces are so positioned in relation to the space and to each other as to allow an air flow through substantially the entire space. This provides for a more efficient air change in the space and thereby a more efficient removal of noxious substance from the joint and its immediate surroundings.

[0019] In an embodiment, the air moving means draws air out of the space. Having the noxious substance-containing air exit the space via the air moving means is beneficial, since an increased control of where the contaminated air exits is obtained, namely via the air moving means.

[0020] In an embodiment, the air exiting the space by means of the air moving means is filtered by means of a filter, such as an activated carbon filter or a charcoal filter or other suitable type of filter or stripper device. Thereby the noxious substance gets collected at the filter, and only substantially non-contaminated air passes into the ambient. This is particularly desirable, when the ambient is an indoors environment.

[0021] In an embodiment, the air moving means is in simultaneous fluid communication with multiple first interfaces of multiple respective spaces. Thereby, the air change of multiple spaces is taken care of by the same air moving means, which enables for less noise and a smaller set-up than if each space were to be connected to each an air moving means.

[0022] In an embodiment, the first and/or the second interface is provided at or by a sealing element. This provides for easy provision of the interface, which may be established in the same go as the sealing element.

[0023] In an embodiment, the space is substantially air tight towards the ambient prior to the provision of the interfaces. Thus, the only way in and out of the space for the air to be changed is via the interfaces, when they are provided. This permits an optimal control of the extent and position of the inflow and outflow of air into and out of, respectively, the space. That is advantageous with regard to obtaining an efficient change of air.

[0024] In an embodiment, the one or more sealing elements comprise a sealing strip and/or filler, which may be provided with a substantially air-impermeable coating. A strip or filler is easily inserted and is easily adaptable to the dimensions of the joint.

[0025] In an embodiment, the at least one sealing element is integrally formed with at least one ventilation means, such as a duct or tube, for fluid communication. This enables fast and easy establishment of sealing of the space and concurrent provision of the interfaces in the space for fluid communication with the ambient and/or the air moving means, respectively.

[0026] In an embodiment, the method comprises the step of fully or at least partially removing a filler, which comprises a source of contamination of the joint with the noxious substance, prior to the step of applying a flow of air through the space by means of the air moving means. Thereby a source of contamination is removed - without causing any destruction or deterioration of the surrounding building elements or parts thereof - which may enable faster conclusion of the remainder of the method for removal. However, it is also conceivable that the method is carried out on a joint with the contaminated filler still sitting in it.

[0027] In an embodiment, in relation to the depth axis, a front sealing element is positioned proximal to the front face of at least one of the building elements, and/or, in relation to the depth axis, a rear sealing element is positioned distal to the front face of at least one of the building elements and/or proximal to the rear face of at least one of the building elements. This enables provision of a space extending throughout substantially the entire depth of the joint. Also, depending on the surroundings, easy insertion of the sealing elements is enabled.

[0028] In an embodiment, a front sealing element is positioned in front of the contaminated filler or, if the contaminated filler has been removed, in front of its residues. In an embodiment, a rear sealing element is positioned behind the contaminated filler or, if the contaminated filler has been removed, behind its residues. Thereby the space formed by the sealing element(s) encloses the contaminated filler or its residues and permits an efficient removal of the noxious substance from the joint and its immediate surroundings. Also, the sealing element(s) need not be removed after the process of removal of the noxious substance is concluded. Any front sealing element may form a new filler of the joint so that further rebuilding of the joint structure comprising insertion of new filler etc. is superfluous. Thus, in a specific embodiment the sealing element is a caulk that replaces a PCB-containing caulk.

[0029] In an embodiment, the first and/or the second interface is positioned at a front sealing element, and/or the first and/or the second interface is positioned at a rear sealing element. A positioning of the first and the second interface at respective sealing elements provides for an efficient air change across substantially the entire space, particularly if they are also positioned at different positions along the height axis. Positioning of both the interfaces at the front sealing element enables easy access and is particularly advantageous when the front sealing element is positioned immediately in front of a contaminated filler or its residues.

[0030] In an embodiment, a blocking material impermeable to the noxious substance, such as a PCB-impermeable foil or primer, is applied at the joint on faces of building elements and sealing elements facing an indoors environment. This inhibits diffusion of the noxious substance into the indoors environment rendering the room habitable or otherwise usable during the removal process. Also, a more efficient removal of the noxious substance from the joint and its immediate surroundings is ensured.

[0031] In another aspect the invention relates to a kit of parts for performing the method of the invention. The kit comprises one or more sealing elements for forming a space at and/or at least partially in a joint between adjacent building elements, air moving means, such as an air pump, first ventilation means, such as a duct, for establishing fluid communication between the space and the air moving means, and second ventilation means, such as a duct, for establishing fluid communication between the space and the ambient, and one or more sealing elements optionally being integrally formed with a ventilation means. In an embodiment the first ventilation means are suitable for providing simultaneous fluid communication between the air moving means and multiple respective spaces. The kit may further comprise a filter, such as an activated carbon filter or a charcoal filter, for filtering the air exiting the space by means of the air moving means. In yet another embodiment the kit comprises a blocking material, such as a PCB-impermeable foil or primer, for application at the joint on a face of a building element and/or a sealing element facing an indoors environment.

[0032] In yet a further aspect the invention relates to a system for removing a noxious substance in the method of the invention. The system comprises one or more sealing elements at a joint between adjacent building elements, such as concrete wall elements, the joint extending along a depth axis (DA) between a front face of at least one of the building elements and a rear face of at least one of the building elements, which one or more sealing elements form a space at and/or at least partially in the joint, air moving means, such as an air pump, a filter, such as an activated carbon filter or a charcoal filter, first ventilation means, such as a duct, for establishing fluid communication between the space, the filter and the air moving means, and second ventilation means, such as a duct, for establishing fluid communication between the space and the ambient. The system may further comprise a blocking material, such as a PCB-impermeable foil or primer, at the joint on a face of a building element and/or a sealing element facing an indoors environment. In another embodiment the first ventilation means are suitable for providing simultaneous fluid communication between the air moving means and multiple respective spaces.

[0033] In the following, examples of embodiments of the invention will be described in further detail with reference to the appended drawings of which:

Fig. 1 is a schematic, isometric representation of a joint between two adjacent wall elements,
Fig. 2 is a schematic, cross-sectional view of the arrangement in Fig. 1 through plane 2-2 in Fig. 1,
Fig. 3 is a schematic, cross-sectional view of the arrangement in Fig. 1 through plane 3-3 in Fig. 1,
Fig. 4 is a schematic, horizontal, cross-sectional view of the joint of Figs. 1-3 prior to removal of a PCB-containing filler, and
Fig. 5 is a schematic, vertical cross-sectional view of the joint of Fig. 4.

[0034] With reference firstly to Fig. 1 and 2, a joint 1 extends between adjacent building elements 2, more specifically between two wall elements. The joint may alternatively extend between any other kind and combination of building

elements, such as between a wall element and a window or door frame element, between two window elements or two door elements, between a wall element and a floor element, between two floor elements, between a floor element and a door or window frame element etc. Both building elements of Figs 3 and 4 are concrete building elements, however, building elements comprising wood, steel, aluminium, brickwork, terrazzo or other rocks or stones or any combination thereof are conceivable.

[0035] The building elements 2 each comprise a front face 3, a rear face 4 and an end face 5. The joint 1 extends along a width axis WA between adjacent end faces 5 of the building elements 2, and along a depth axis DA between the front face 3 and the rear face 4 of both building elements 2. The end faces 5 of the building elements 2 are parallel, resulting in a substantially uniform width through the entire depth of the joint 1, however, this need not be the case. Likewise, a joint may for instance extend between the front face of one building element and the end face of another, while extending in the depth direction between the front and rear faces of the other. That would for example be the case for a "T-arrangement" of wall elements.

[0036] The joint 1 extends along a height axis HA, which is perpendicular to the width axis WA and to the depth axis DA. In the schematically depicted arrangement as best seen from Fig. 3, the joint 1 extends along the height axis HA from a floor module 6 to a ceiling module 7. However, depending on the arrangement and type of building elements, other elements may form upper and lower delimitations of the joint. For instance, in case of a joint extending between two adjacent floor modules, the upper and lower delimitations of the joint could be formed by wall elements. In case of a joint extending, for instance, between two adjacent, upright wall elements, the width axis and the depth axis extend substantially horizontally, and the height axis extend substantially vertically. Likewise, in case of a joint extending, for instance, between two adjacent, substantially horizontal floor elements, the width axis and the height axis extend substantially horizontally, while the depth axis extend substantially vertically.

[0037] The dimensions of a joint, from which PCB is to be removed, may vary depending on the construction, the type of adjacent building elements, etc. The joint 1 of Figs 1-3 has a width of approximately 20 mm.

[0038] In Figs. 4 and 5, the joint 1 is schematically depicted in a state prior to the execution of the method according to the first aspect of the invention. The position of a PCB-containing filler 10 in relation to the joint 1 is seen.

[0039] The PCB-containing filler 10 is removed in a per se known manner prior to the execution of the method according to the first aspect of the invention. The removed PCB-containing filler 10 and any filler residues is in Fig. 3 indicated by the shaded area 11. However, the method may be carried out on a joint without removing the PCB-containing filler, or the PCB-containing filler may be removed at least prior to the step of applying a flow of air through a space by means of air moving means.

[0040] Two sealing elements, a front sealing element 8 and a rear sealing element 9 are provided at the joint 1. The front sealing element 8 is, in relation to the depth axis DA, positioned proximal to the front face 3 of both building elements 2. The rear sealing element 9 is, also in relation to the depth axis DA, positioned distal to the front face 3 of both building elements 2 and proximal to the rear face 4 of both building elements 2. Other arrangements of sealing elements are conceivable depending on the arrangement of the joint, the adjacent building as well as the location of the PCB-containing filler and/or its residues. For instance, in other embodiments, there may only be provided a front sealing element.

[0041] The sealing elements 8, 9 are forming a space 12 in the joint. As seen in Figs. 1-3, the space 12 extends across substantially the entire depth and across the entire height of the joint 1. In other embodiments, the space may extend across only part of the height and/or depth and/or even outside the joint in case of a sealing element bridging the adjacent building elements outside the joint.

[0042] The sealing elements 8, 9 are so positioned as to allow a diffusion of the noxious substance from the adjacent building elements and any PCB-containing filler residues into the space.

[0043] As is seen from Fig. 3, air moving means in the form of an air pump 13 is provided. Fluid communication between the space 12 and the air pump 13 is provided by means of a first interface 14 between the space 12 and ventilation means in the form of a first duct 15. Also, fluid communication between the space 12 and the ambient 16 is provided by means of a second interface 17 between the space 12 and ventilation means in the form of a second duct 18. Apart from the interfaces 14, 17, the space 12 is substantially air tight towards the ambient. In some embodiments, top and/or bottom sealing elements may be provided.

[0044] As indicated in Fig. 3, the air pump 13 draws air out the space 12 via the first duct 15, and fresh air is allowed to enter the space 12 via the second duct 18. In other embodiments, the air pump may be configured to blow air into the space via the duct forcing air to exit the space via the other duct.

[0045] In embodiments where only a front sealing element is provided and the interface between the space and the ambient is made up by an open rear end of the joint, it is preferred if air is drawn out of the space by means of the pump via a duct, permitting fresh air to enter the space via the open rear end of the joint so as to obtain control over where the contaminated air exits.

[0046] As depicted in Fig. 3 the sealing elements 8, 9 and the ventilation means 15, 18 are separate elements, namely sealing strips and ducts, respectively. However, embodiments comprising combined sealing elements and ventilation means integrally formed are conceivable, as are embodiments comprising sealing elements in the form of fillers. The

sealing strips are coated with a substantially air tight coating (not discernible in the figures). Embodiments are conceivable, where air tight coating of the sealing elements is not necessary due to the nature of the sealing elements.

[0047] Although not indicated in the figures, a filter, such as an activated carbon filter or a charcoal filter, collecting the noxious substance is provided at the duct 15, via which the air exits the space 12. In some embodiments, a flow guard or other means for monitoring the filter condition is provided. Alternatively, manual inspection may be carried out.

[0048] As seen from Fig. 3, the respective interfaces 14, 15 are so positioned in relation to the space 12 and to each other as to allow an air flow through the space 12 to provide an air change in the space. The air change may be continuous or periodical. For instance, in case of a noisy air pump, it may be expedient in an office building to have the pump running during night and paused during working hours, while in living quarters it may be more expedient to have the pump running during day and paused during night. Alternatively, the pump may run uninterruptedly.

[0049] The low position of the interface 15 and the high position of the interface 14 in relation to the space 12 and to each other allow an air flow to flow through substantially the entire space 12. Particularly, a flow is obtained in the vicinity of the residues from the PCB-containing filler. Other arrangements of the interfaces are conceivable. For instance, the second interface may be provided at the rear sealing element.

[0050] As indicated in Fig. 3, both interfaces 14, 17 are provided at sealing elements. In other embodiments, interfaces may be provided in the building elements.

[0051] Although not depicted in the figures, an air-permeable insulation material may be present in the joint between the interfaces.

[0052] Although the air moving means 13 are shown as connected only to one space 12, in other embodiments the air moving means may be in simultaneous fluid connection with multiple spaces possibly in respective multiple joints.

[0053] A blocking material 19 impermeable to the noxious substance is applied at the joint 1 on faces 3, 20 of building elements 2 and front sealing element 8 facing an indoors environment 21. The blocking material is a PCB-impermeable foil, such as an aluminium foil, however in other embodiments, the blocking material may be any suitable type of foil or primer. Although depicted in Fig. 1 as extending only along part of the joint 1 along the height axis HA, it is understood that the blocking material 19 extends along substantially the entire joint along the height axis HA. Although less preferred, other extends of the blocking material are conceivable.

[0054] Although the invention is described in connection mainly with PCB, it is understood that the method is applicable to removal of other noxious substances, such as chlorinated paraffins.

[0055] Although the invention has mainly been described with reference to specific embodiments other embodiments than the ones disclosed are equally possible within the scope of the invention as defined by the appended claims.

Example

[0056] An office space in a building in Taastrup, Denmark, constructed from concrete with a PCB-containing filler material serving as a sealant between slabs of concrete was treated according to the invention. The filler material contained up to 200,000 mg/kg of PCB and this concentration had, since the construction of the building, resulted in PCB-concentrations of more than 50 mg/kg in the concrete immediately surrounding the joints between concrete slabs. The PCB-containing filler and the PCB-contaminated concrete provided a PCB-concentration in the air of the office space above 500 ng/m^3 of air, significantly above the maximum acceptable level of 300 ng/m^3. In this case removal of the filler alone was not sufficient to lower the PCB-concentration in the office air to the maximum acceptable level.

[0057] In five locations PCB-containing filler material was removed together with residual filler material and the five joints were then provided with sealing elements based on a PCB-free silicone rubber. Air-inlet interfaces were provided in the front-facing sealing elements, and a tube was attached to the outlet interfaces. The tube was connected to a commercial aquarium pump via an activated carbon filter. The front-face of the joint including the sealing element was covered with a blocking material of a PCB-impermeable aluminium foil.

[0058] The aquarium pump and the activated carbon filter were placed above the ceiling panels of the suspended ceiling so that they were concealed to people in the office. This allows that the PCB-removal procedure is continued after an acceptable PCB-concentration is reached in the office without hindering the daily use of the office.

[0059] After activation of the pump the PCB-concentrations were monitored regularly. Exemplary values of PCB-concentrations are provided in Table 1. The PCB-concentrations in the air entering the activated carbon filter was generally in the range of 3,000 to 13,000 ng/m^3.

Table 1 PCB-concentrations

Date	29 May 2012	6 June 2012	20 June 2012
	ng/m^3	ng/m^3	ng/m^3
Office air	530	362	214

(continued)

Date	29 May 2012	6 June 2012	20 June 2012
Joint 1	1968	1290	755
Joint 2	2592	1437	899
Joint 5	1144	960	382

[0060] Thus, the method of the invention provided that the air in the office space was lowered to the maximum acceptable level of 300 ng/m^3.

List of reference signs

[0061]

1 Joint
2 Wall elements
3 Front face of wall element
4 Rear face of wall element
5 End face of wall element
6 Floor module
7 Ceiling module
8 Front sealing element
9 Rear sealing element
10 PCB-containing filler
11 Residues from/removed PCB-containing filler
12 Space
13 Air pump
14 First interface between space and first duct
15 First duct
16 The ambient
17 Second interface between space and second duct
18 Second duct
19 Blocking material
20 Front face of front sealing element
21 Indoors environment

WA Width axis
DA Depth axis
HA Height axis
W Width of joint
D Depth of joint

Claims

1. A method for removing a noxious substance, such as PCB, from a joint (1) between adjacent building elements (2), such as concrete wall elements, and from the adjacent building elements (2), the joint extending along a depth axis (DA) between a front face (3) of at least one of the building elements and a rear face (4) of at least one of the building elements, the method comprising the steps of:

providing one or more sealing elements (8, 9) at the joint forming a space (12) at and/or at least partially in the joint,
providing an air moving means (13), such as an air pump,
providing a first interface (14) with the space allowing fluid communication between the space and the air moving means, and
providing a second interface (17) with the space allowing fluid communication between the space and the ambient (16),

the respective interfaces being so positioned in relation to the space and to each other as to allow an air flow through the space, and
applying an air flow through the space by means of the air moving means so as to provide a change of air in the space until an acceptable level of noxious substance in the joint (1) and the surroundings is reached.

2. The method according to claim 1, wherein the respective interfaces are so positioned in relation to the space and to each other as to allow an air flow through substantially the entire space.

3. The method according to any of the previous claims, wherein the air moving means draws air out of the space.

4. The method according to any of the previous claims, wherein the air moving means are in simultaneous fluid communication with multiple first interfaces of multiple respective spaces.

5. The method according to any of the previous claims, wherein the first and/or the second interface is provided at or by a sealing element.

6. The method according to any of the previous claims, wherein the space is substantially air tight towards the ambient prior to the provision of the interfaces.

7. The method according to any of the previous claims, wherein the one or more sealing elements comprise a sealing strip and/or a filler, and/or wherein at least one sealing element is integrally formed with at least one ventilation means (15, 18), such as a duct or tube, for fluid communication.

8. The method according to any of the previous claims, wherein, in relation to the depth axis, a front sealing element (8) is positioned proximal to the front face (3) of at least one of the building elements, and/or wherein, in relation to the depth axis, a rear sealing element (9) is positioned distal to the front face of at least one of the building elements and/or proximal to the rear face (4) of at least one of the building elements.

9. The method according to claim 8, wherein the first and/or the second interface is positioned at a front sealing element (8), and/or wherein the first and/or the second interface is positioned at a rear sealing element (9).

10. The method according to any of the previous claims, comprising the further step of applying a blocking material (19) impermeable to the noxious substance, such as a PCB-impermeable foil or primer, at the joint on faces (3, 20) of building elements and sealing elements facing an indoors environment (21).

11. The method according to any of the previous claims, further comprising the step of removing a filler (10), which comprises a source of contamination of the joint with the noxious substance, prior to the step of applying a flow of air through the space by means of the air moving means.

12. The method according to any of the previous claims further comprising filtering the air exiting the space in a filter, such as an activated carbon filter or a charcoal filter.

13. A system for removing a noxious substance in the method according to claim 12, the system comprising
one or more sealing elements (8, 9) at a joint (1) between adjacent building elements (2), such as concrete wall elements, the joint extending along a depth axis (DA) between a front face (3) of at least one of the building elements and a rear face (4) of at least one of the building elements, which one or more sealing elements (8, 9) form a space (12) at and/or at least partially in the joint,
air moving means (13), such as an air pump,
a filter, such as an activated carbon filter or a charcoal filter,
first ventilation means (15), such as a duct, for establishing fluid communication between the space, the filter and the air moving means, and
second ventilation means (18), such as a duct, for establishing fluid communication between the space and the ambient (16).

14. The system according to claim 13 further comprising a blocking material (19), such as a PCB-impermeable foil or primer, at the joint on a face (3, 20) of a building element (2) and/or a sealing element (8) facing an indoors environment (21).

15. The system according to claim 13 or 14, wherein the first ventilation means are suitable for providing simultaneous fluid communication between the air moving means and multiple respective spaces.

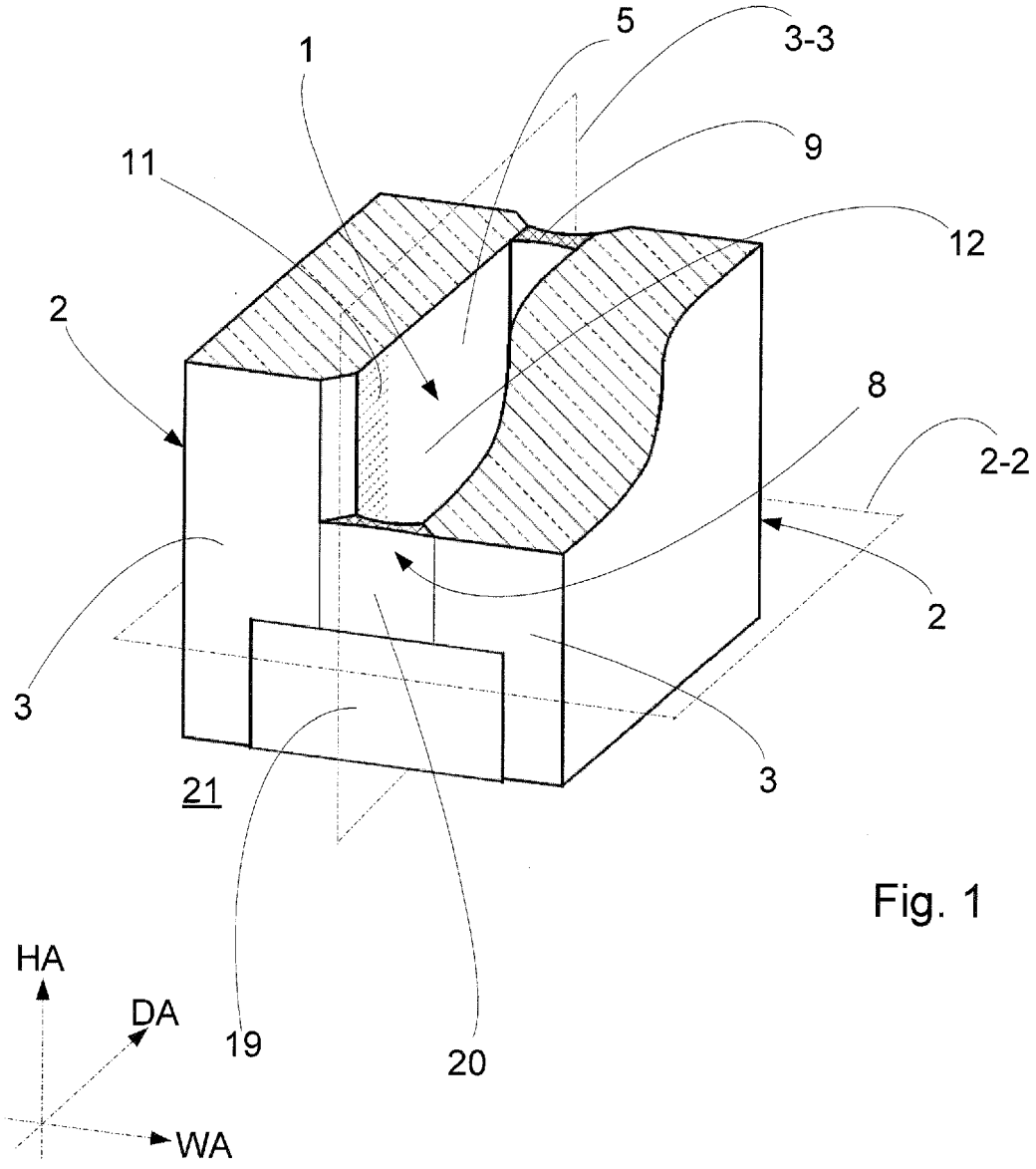

Fig. 1

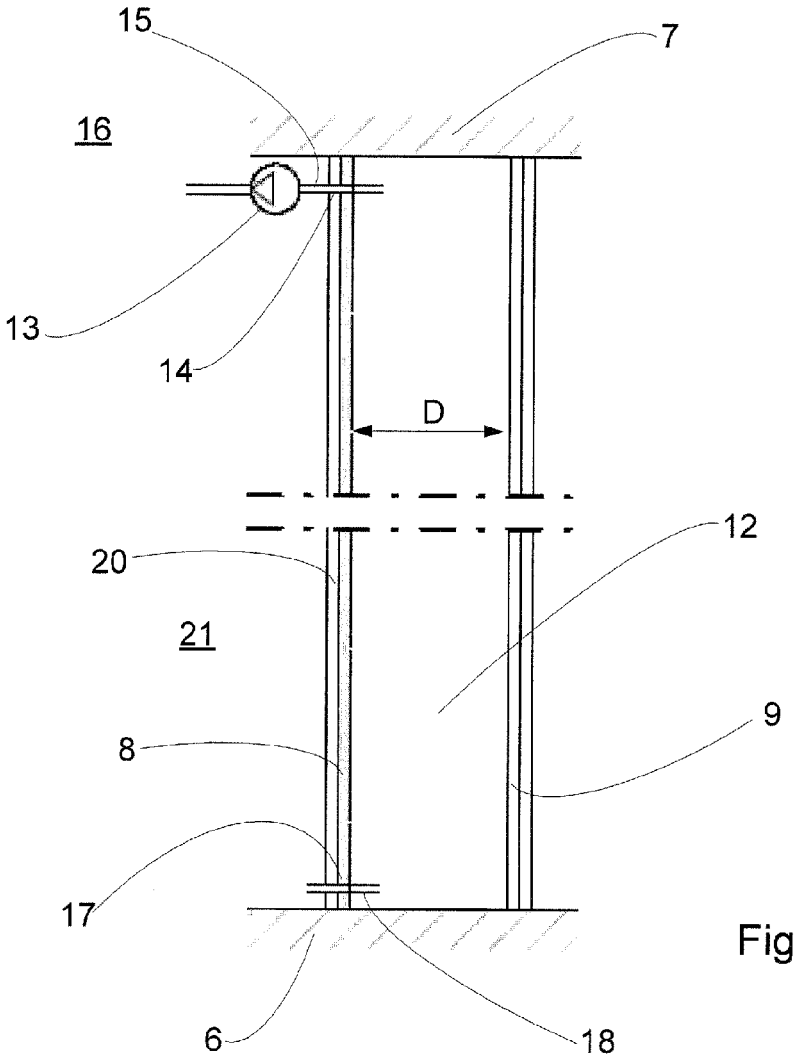

Fig. 3

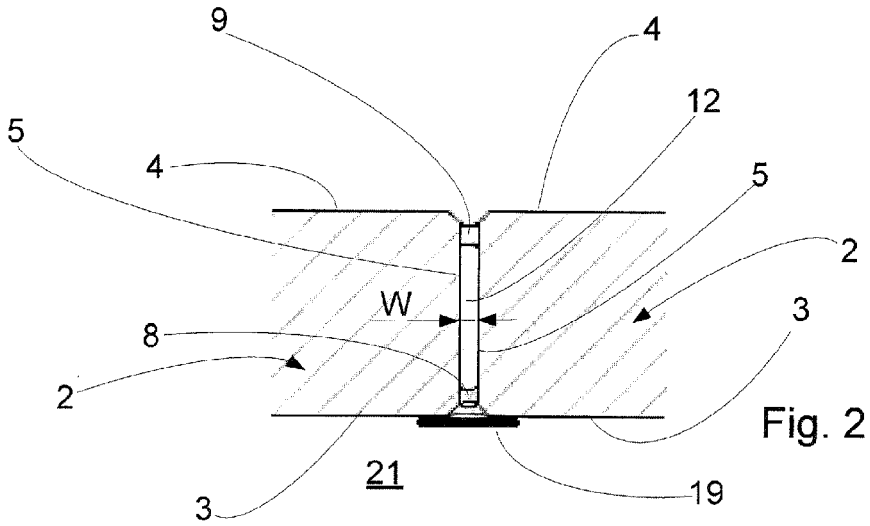

Fig. 2

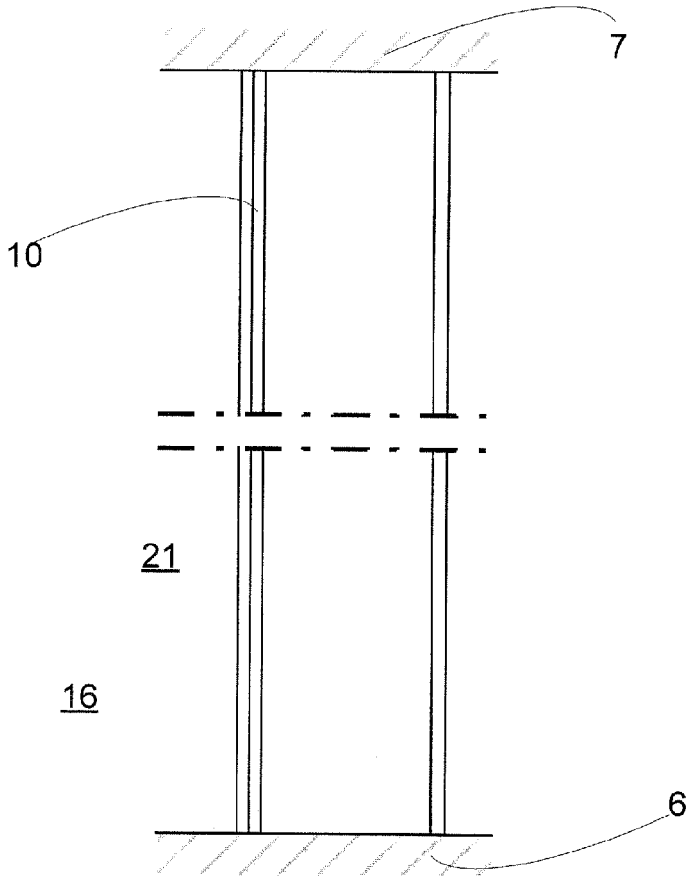

Fig. 5

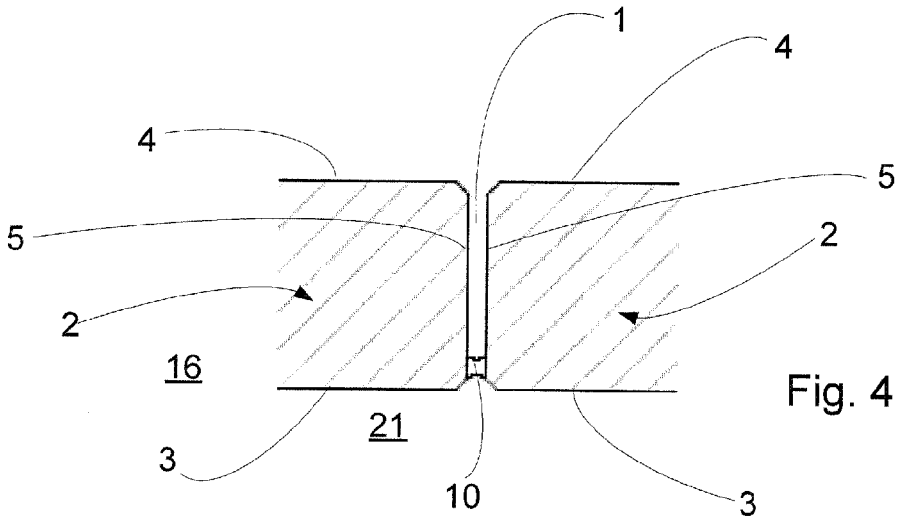

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 13 17 8848

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	DE 42 12 109 A1 (HOWE BAU & UMWELTSCHUTZ GMBH [DE]) 14 October 1993 (1993-10-14) * the whole document * -----	1-7,10, 11 8,9, 12-15	INV. E04F21/00 B08B5/02 B26F3/00 E02D29/16
Y	DE 43 37 114 A1 (HOHENLEITNER HERBERT [DE]) 4 May 1995 (1995-05-04) * column 2, line 44 - line 52 * * column 3, line 5 - line 6 * -----	8,9, 12-15	E01C23/09 E04B1/68 E04G23/00

TECHNICAL FIELDS SEARCHED (IPC)

E04F
B08B
B26F
E02D
E01C
E04B
E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 November 2013	Topcuoglu, Sadik Cem

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13-11-2013

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DE 4212109 A1	14-10-1993	NONE	
DE 4337114 A1	04-05-1995	NONE	

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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