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(54) **System comprising a scaffold, and method for working on the upper side of a glass roof**

(57) System to treat the upper side of a glass roof, comprising a scaffold which has a plurality of two or more walking panels which are removably mutually mounted and extending in the longitudinal direction of the scaffold,

the scaffold bearing fully or along its length between its ends at a plurality of at least two locations onto the roof, preferably onto the rods into which the panes of the roof are housed, or on another supporting structure of the roof.

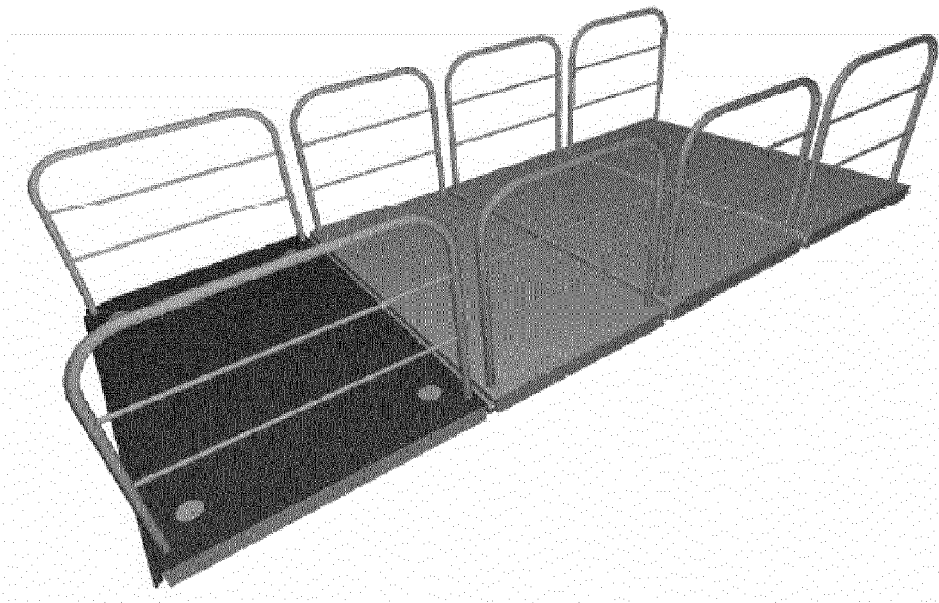


Fig. 1

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Description

[0001] System, e.g. building scaffold, and method to act at the top of a glass roof.

[0002] This invention relates to a system and method to act at the top of a glass roof, e.g. to clean/wash the windows. The invention is in particular done for glass roofs at high level, e.g. of a from several floors made office building with an atrium covered by a glass roof. Such a building is presently in use with the Ministry of Finance in The Hague, Netherlands. The invention offers in particular a proper solution to a building which by its shape not by nature offers a means at which an implement can be suspended from which the glass roof can be treated, e.g. a building the glass roof of which provides the ultimate top.

[0003] As far as the inventor knows, presently such glass roofs are treated from a crane or gondola, or one simply stands immediately on top of the glass, such that the loads are high, or on top of the rods, somewhat like rope dancing.

[0004] The patent FR2763619 discloses a system to treat a glass ceiling, which system comprises something like a hammock with which hanging below the ceiling its lower side can be cleaned. This known system is not only different from the inventive proposal, it is also designed to treat the lower side of the glass while the invention is designed to treat the top side, thus the side receiving sky precipitation etc.

[0005] A glass roof can be e.g. constructed such that the panes are with their edges clamed within the supporting structure or such that the panes with the edges bear onto the supporting structure, in both which cases the supporting structure limits a pattern of, mostly rectangular, openings filled by the panes. The panes can thus be located below, within or above the upper face of the supporting structure. Also different constructive shapes of the glass roof are feasible.

[0006] The object of the invention is versatile and relates to particularly one or more of the following:

- safety;
- ergonomics;
- manageable weight and dimension;
- speed and efficient operation;
- cost efficient solution;
- ease of storage onto the roof.

[0007] The proposal is to across or onto the preferably flat glass roof locating a temporary scaffold, preferably such that no or minimal pressure/flexure is exerted to the panes, at least the parts of the panes not immediately supported by the roof structure. The operator can take position onto the scaffold and from there treat the roof. From a non glass part of the building the operator can get to the scaffold.

[0008] The scaffold, onto which the operator preferably can walk upright, preferably has one or more of the fol-

lowing properties: is designed to bear at a plurality of at least two locations along the length between the ends of the scaffold, preferably substantially along the complete length, onto the roof, e.g. onto one or more glass rods or another part of the bearing structure of the roof, preferably one or more glass rods/structure parts extending parallel to the longitudinal/walking direction of the scaffold; has at both sides, viewed longitudinally, supporting means to bear onto the roof, which are located at a width distance substantially equal to the distance between two longitudinally from the scaffold extending glass rods/structure parts; is assembled from a plurality of at least two or three separate segments, like panels, which in use preferably substantially lay horizontal or are laying positioned and/or substantially parallel to the roof plane (the roof plane is preferably substantially horizontal as with a flat roof, however use with a slanting roof is also feasible, preferably with limited roof angle to avoid that by gravity action one will slide/slip at the face of the scaffold), which are preferably for walking, preferably with a substantially flat top face to walk on it, and which preferably in mutual extension are located on top of the roof, preferably with mounting means are releasably mutually connected, preferably upwards pivoting, to assemble the scaffold; is assembled on site by successively placing of segments such that the length of the scaffold each time increases; has at one or two sides a, preferably removable, railing which is preferably assembled from separate parts in mutual extension preferably equal with the segments; has securing means, preferably distributed along the length and/or width of the scaffold to secure to the building, e.g. suction cups which are preferably designed to engage the panes; has a width substantially equal to the distance between two in longitudinal/walking direction of the scaffold extending glass rods; has a length substantially equal to at least the length of the glass roof; a preferably collapsible feature to aid with upward pivoting of a mounted panel/segment, e.g. a (e.g. flexible) pulling member; provides a downward and/or sideways fall through free walking face.

[0009] The passable panels/segments of the scaffold have preferably one or more of the following properties: made of plastic or polymer material, preferably fibre reinforced, like PVC; with one or more, preferably integral or embedded, stiffening means, such as stiffeners, e.g. of aluminium, with which the panels are made more flexural rigid; stiffening means making the panels more flexural stiff, preferably transverse of the scaffold; mounting means for the with the edges removably mutual connecting, preferably such that they can pivot upward if mutually mounted; mounting points for removably mounting of the railing or part of it; one or more securing means for engagement with the roof, such as suction cups, preferably at a location designed to engage a pane; a preferably collapsible feature to aid with upward pivoting of a mounted panel/segment, e.g. a (e.g. flexible) pulling member, such as a pulling rope; one or more projections at the lower side, such as supporting feet, resting onto the roof

such that the rest of the panel remains remote above the roof or panes of it.

[0010] The scaffold can be designed to exclusively extend straight, or can follow a curve to the left or right, or follow a more complicated shape, e.g. in top view a track in the shape of a triangle or square.

[0011] Preferably the scaffold does not bear on the part of the pane which is not immediately supported by the supporting structure of the roof. The edges of a pane are immediately supported by the supporting structure if they immediately bear onto them, i.e. are located immediately on top. In case the panes with the edges are located on top of the supporting structure, the scaffold can bear onto the edges of the pane, which as a rule immediately bear onto the supporting structure. In that case the scaffold bears indirectly onto the supporting structure. In other cases it could be preferable if the scaffold bears immediately onto the supporting structure, in other words not with the intermediate of the panes.

[0012] Thus with the invention one can avoid that the panes are loaded by bending during treating the roof. Although it is preferred that the panes are completely isolated from bending by the scaffold and the people on top, on the other hand an allowable load from the scaffold could be accepted. E.g. if the passable panels of the scaffold are extremely flexural stiff, e.g. more flexural stiff than the panes above which they are located, a full surface bearing of the panels onto the roof could be allowed. The panels bear then at parts of the panes which are not supported by the supporting structure or at least make contact with those parts, such that in such a case there is a chance that the panes are loaded by bending from the scaffold, although to a limited extend.

[0013] An example of the invention is shown in the attached drawing in perspective and is described as follows:

- Fig. 1 shows the scaffold assembled (in half);
- Fig. 2 shows locating of a second panel;
- Fig. 3 shows three panels/segments;
- Fig. 4 shows adding a piece of railing;
- Fig. 5 shows adding more railing;
- Fig. 6 shows the scaffold at a roof.

[0014] The scaffold is assembled from in mutual extension located separate loop panels temporary mutually assembled. Each panel is e.g. of fibre reinforced polyester with embedded aluminium frame and bears onto the pane frames/rods and substantially or completely not onto the panes. The supports which bear onto the pane frames are provided with a rubber profile or such easily deformable feature.

[0015] The internal aluminium frame not only serves to reinforce the polyester parts (to avoid bending and contact with the glass panes) but also such that the scaffold can be provided with a number of removable safety railings such that the safety can be secured.

[0016] Since of the roof the first rows panes around

the glass roof have a dimension different from all panes in between, the first and last walking panels are larger and they are provided with four suction mountings and have a different colour, the latter to avoid incorrect locating. The intermediate panels are hooked to each other and to the first/last panels and are mutual exchangeable such that assembling is easy.

[0017] As soon as the first panel is manually located onto the pane frame and secured by means of the four suction mountings, the second panel can be coupled to the first by means of the hooking mounting system and be laid onto the pane frame. The second part is subsequently with its two suction mountings fixed to the pane. Further each following panel is in this manner mounted.

[0018] For safety reasons it could be advantageous to after each one panel is laid down it first is provided with the relevant safety railing before the next panel is located.

[0019] The walking panels are at the walking face provided with an anti skid profile and constructed such that any type of immediate loading of the glass panes is avoided.

[0020] The vacuum securing system is merely designed to avoid sliding away of blowing away of the relevant walking panels. The safety railings are made of aluminium to ensure the portability.

[0021] Central of each walking panel there is a recessed eye to which a pulling rope is mounted which simplifies adding and removing of the relevant panel by means of in the upright position hooking fixedly to the last already installed walking panel and subsequently downward pivoting of the just added walking panel, pivoting around the hook mounting with the formerly installed walking panel. Removing is vice versa, standing at the one walking panel and pulling at the rope such that the relevant walking panel pivots upward to be subsequently picked up and hooked free. This avoids that one has to walk the glass roof for installing or removing the scaffold.

[0022] The extendible rope is provided with a spring or different reset means automatically withdrawing/winding the rope after installing or removing of the walking panel, to ensure that the rope and the eye are always recessed within the walking panel while the scaffold is in use such that there is no risk for stumbling over projecting parts.

[0023] An alternative to the pulling rope to upward pivoting of the latest hooked walking panel is a separate stick with hook at the end to engage behind the remote edge of the walking panel, or a for that purpose provided engagement means at the walking panel.

[0024] The vacuum securing system is a simple suction cup (as applied to handle large panes) which by means of operating a handle can generate a very large suction to a smooth and non porous face, sufficient to temporary secure the walking panels to the existing panes without exerting a pressure load to it. In the same manner, by operating the handle, the suction is removed and thus the anchoring.

[0025] Also alternatives belong to the invention. E.g. the suction securing system is in stead of with a handle activated/deactivated by a suction pump or different system.

working face.

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Claims

1. System to treat the upper side of a glass roof, comprising a scaffold which has a plurality of two or more walking panels which are removably mutually mounted and longitudinally of the scaffold are next to each other, which scaffold at full surface or along its length between its ends at a plurality of at least two locations bears onto the roof, preferably onto the rods into which the panes of the roof are housed, or another supporting structure of the roof, possibly with the intermediate of pane material straight above the supporting structure. 10
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2. System according to claim 1 with a from a plurality of two or more railing pieces, longitudinally of the scaffold next to each other, assembled railing, preferably at both sides, possibly removable. 25
3. System according to claim 1 or 2, which scaffold is designed such that it can on site be assembled from walking panels and possible railing pieces and temporary spread onto the roof to provide an against downward and possibly sideways falling protected and across the glass roof extending walking and working face. 30
4. System according to any of the claims 1-3, wherein the walking panels have securing means to secure to the rood, e.g. suction cups. 35
5. Method to treat the upper side of a glass roof, wherein a scaffold is on site at the roof assembled by successively immediately in the operating position spreading of a plurality of at least two walking panels which will be provided longitudinally of the scaffold. 40
6. Method according to claim 5, wherein one or each next walking panel first to the latter walking panel is pivotable mounted and subsequently from an upright position is pivoted downward to bear onto the supporting structure of the roof, and/or, preferably subsequently, is secured to the roof against movement. 45
50
7. Method according to claim 5 or 6, wherein rail pieces, longitudinally of the scaffold next to each other, are assembled to a railing mounted to the walking panels. 55
8. Method according to any of claims 5-7, to provide an against sideways and downward falling secured and across the glass roof extending, walking and

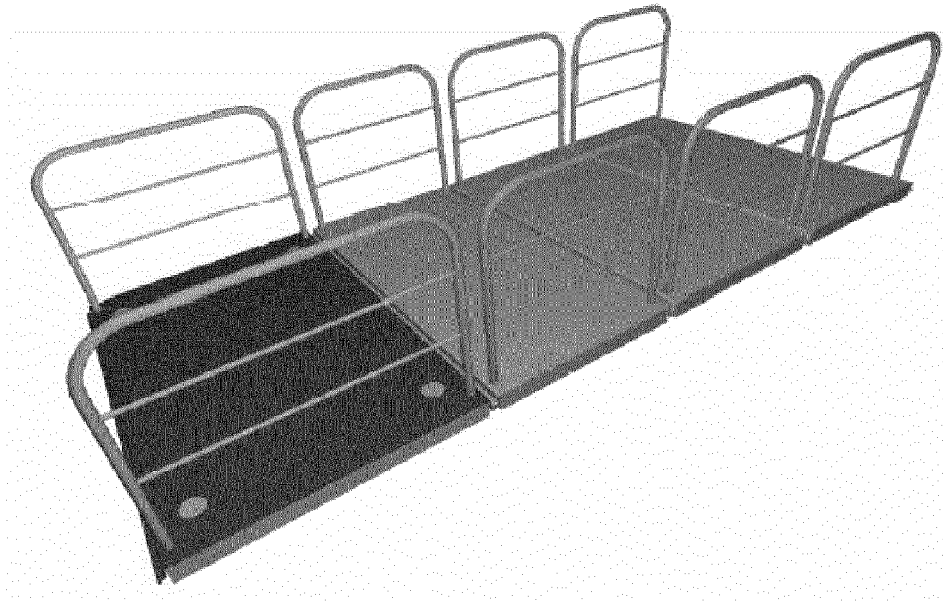


Fig. 1

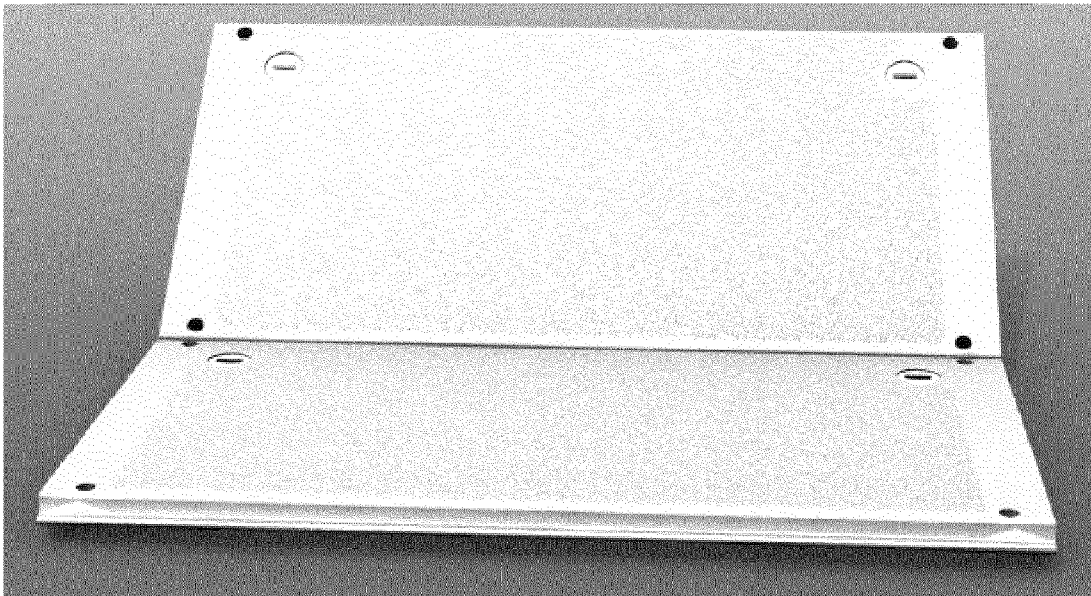


Fig. 2

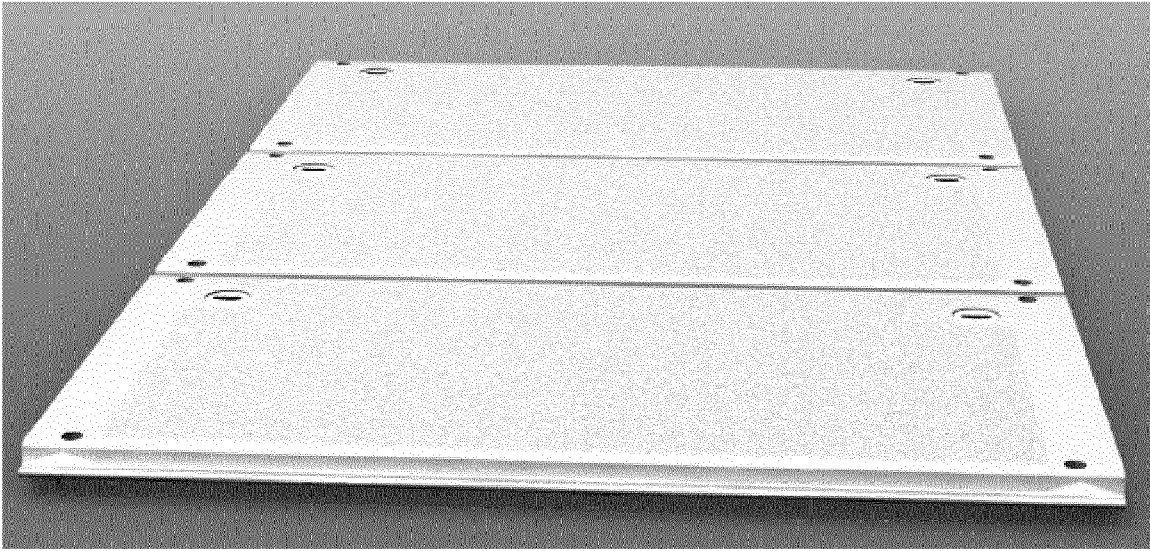


Fig. 3

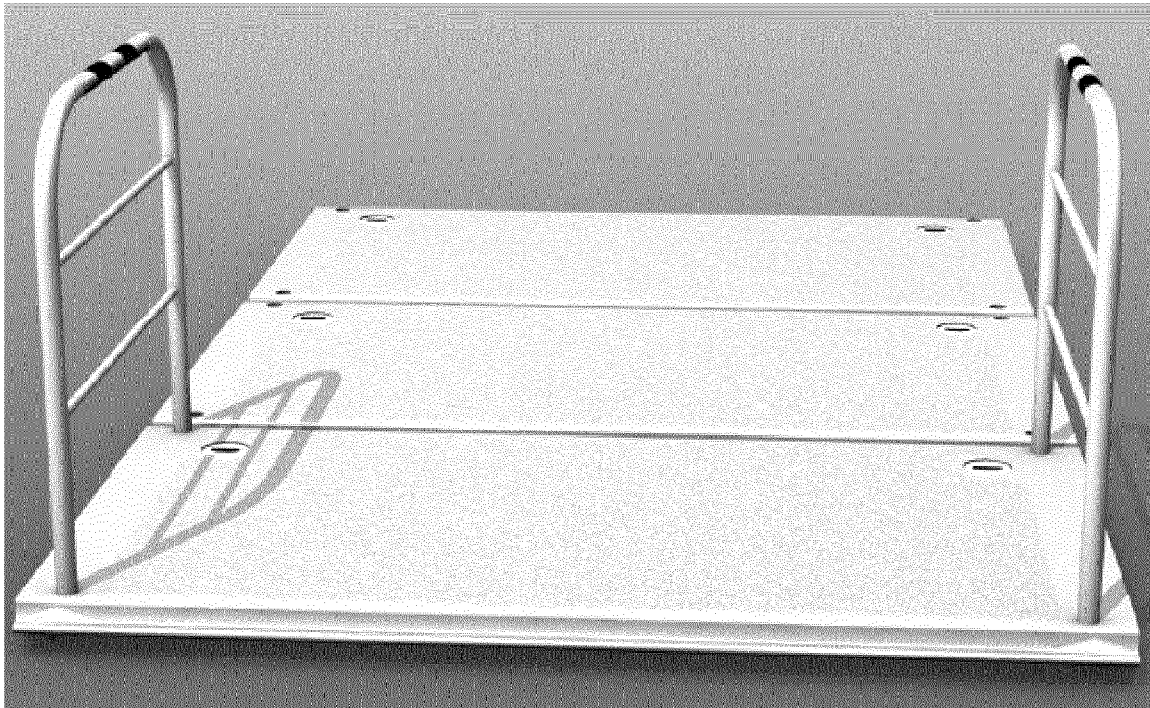


Fig. 4

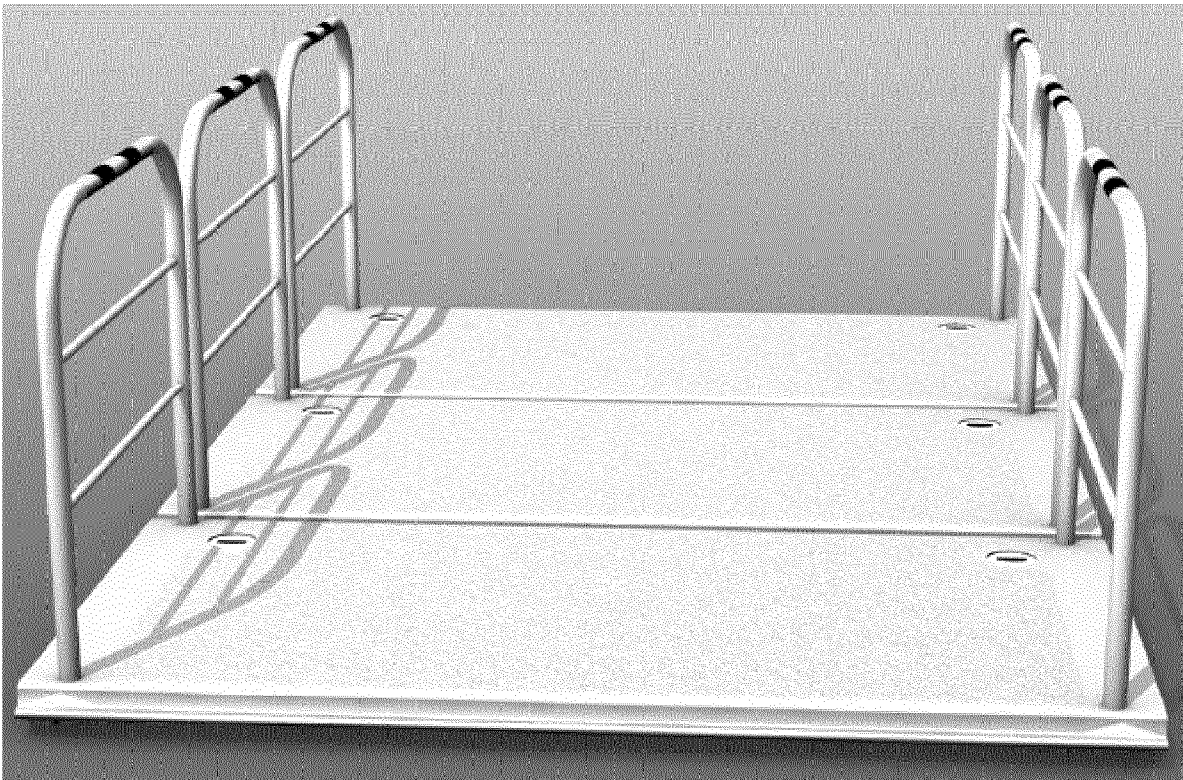


Fig. 5



Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 11 18 4999

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 January 2012	Examiner Scharl, Willibald
CATEGORY OF CITED DOCUMENTS		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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 18 4999

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