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(54) **Method and system for sealing of openings in a building during construction**

(57) A method for sealing a door or window opening of a building under construction. A door or window is mounted in the door or window opening so as to seal the opening during a further construction phase of the building. The door or window is the component which is actually intended for permanent installation in the door or window opening. Further, a removable knockproof panel, such as a transparent or semi-transparent polymeric panel, is mounted in front of the door or window, such as covering the entire front of the door or window. Hereby, the door or window front is protected in the building construction phase. This eliminates the need for interim sealing solutions using wooden structures and plastic foils and the like. Compared to existing methods, energy is saved to heating of the interior of the building during the construction phase, because the high thermal insulation effect of the permanent door or window is provided at an early stage. The knockproof panel may be a transparent 2-20 mm thick polycarbonatic plate. One or more further panels may be arranged to protect sides of the door or window. A combined fitting means may be used to both mount the door or window in the opening, and to fasten the knockproof panel in a removable way so as to allow easy removal from the knockproof panels. This allows the protective panels to be mounted by the door or window manufacture for easy installation at the building site.

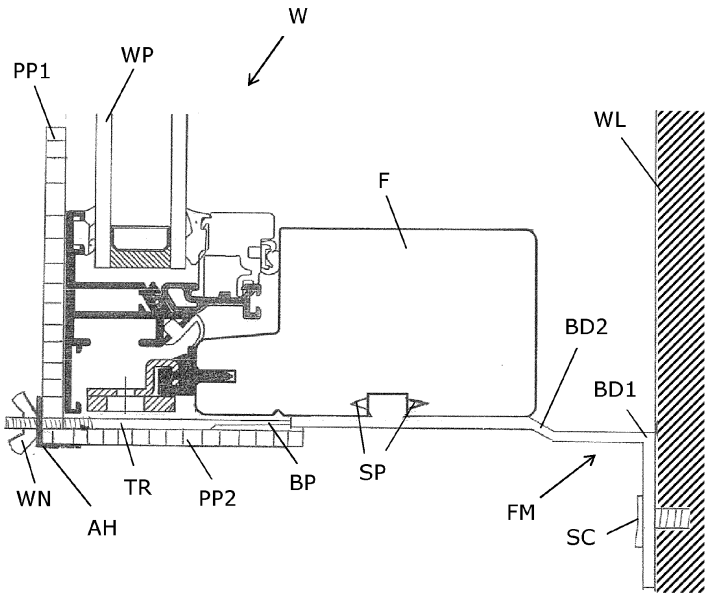

Fig. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of building construction. More specifically, the invention provides a method and a system for interim sealing of window and door openings in a building under construction.

BACKGROUND OF THE INVENTION

[0002] During construction of a building, it is a normal situation that door and window openings in the walls of the building are sealed by means of interim means for several months. Such sealing means are often in the form of wooden plates or thin polymeric foils or the like which help to ensure that rain or snow does not enter the building. However, in order to speed up the process of drying the concrete inside the building, it is common to warm up the building, e.g. by means of electric heaters, district heating, or the like. During the winter season, a large amount of electric energy is used to heat buildings, due to the poor thermal insulation of the building because of the interim sealing of the door and window openings which only provide little or no thermal insulation.

[0003] Thus, both with respect to economical and environmental considerations, the waste of energy for heating the building in the construction phase due to poor interim sealing methods is a problem. To help this problem, solutions exist in the form of sealing plates which provide at least a limited thermal insulation, however such solutions are rather expensive.

[0004] A further problem with existing methods for interim sealing of door and window openings is the man power required to mount the interim sealing means. Afterwards, man power is also required to remove the interim sealing means and possibly also destroying it or transporting it away from the building site, at the time the wall construction has been finished and the permanent doors and windows should be finally mounted.

SUMMARY OF THE INVENTION

[0005] Following the above description, it may be seen as an object of the present invention to provide a method and a system for sealing of door or window openings of a building while the building is still under construction. The method and system should save energy to heating, and it should be easy to apply to a normal building construction process.

[0006] In a first aspect, the invention provides method for sealing a door or window opening of a building under construction, the method comprising

- mounting a door or window in the door or window opening so as to seal the opening during a further construction phase of the building, wherein the door or window is arranged for permanent installation in the door or window opening, and
- mounting a removable knockproof panel, such as a transparent or semi-transparent polymeric panel, in front of the door or window, so as to protect at least a majority of a front area of the door or window, preferably covering the entire front of the door or window.

[0007] By 'under construction' is understood that the building is in a phase where it is out of its intended normal use, especially during construction of a new building, where walls with door or window openings have been built, but remaining interior and exterior part of the building is not finished. Especially, in case of brick wall or concrete building, there is a need for providing heat to speed up the process of drying the interior part of the building.

[0008] By mounting the doors and windows intended which are intended for permanent installation in the building provides a significant increase in thermal insulation effect compared to normal interim sealing methods. Thus, a significant amount of energy for heating the building during the construction phase can be saved, since the thermal insulation effect of the doors and windows that are intended for permanent use in the building is taken advantage of already at an early phase. This is made possible by means of the removable knockproof panel which serves to protect the door or window from possible damage due to the ongoing work e.g. by bricklayers during the construction phase of the building. Such damage may be in the form of accidential physical impact on the door or window front or frame or by splashes of acid on the door or window. This is why it is normally not possible to mount the doors and windows intended for permanent installation during the construction phase, since the expensive doors and windows will most often be damaged if present in this phase. Instead interim sealing solutions are normally selected.

[0009] Apart from the saved energy expenses, the invention provides a number of advantages since the invention allows that a building can be made airtight at an early stage in the construction process. Draught inside the building is avoided, an improved working environment is obtained, the drying of the interior of the building is improved, a better finish can be obtained, and in general a higher level of quality of the building can be obtained. Further, it is possible to comply with legal requirement in the winter period which exist at least in some countries. Still further, extra expenses man lift or scaffolds can be avoided. It is easy to provide a correct sealing of the building. Expenses are saved to interim sealing solutions, and in general the elimination of interim sealing solutions helps to provide a more efficient construction process. Finally, the more efficient construction process results in a smaller requirement for man, thus decreasing wages expenses during the construction phase.

[0010] After the construction phase has been completed, the removable panels can be removed, and the doors

and windows can be finally joint to the wall. Thus, there is only a minimum of work required to remove the knockproof panels re-used, and compared to prior art solutions, there is no need to dismantle and to destroy interim wooden structures or the like, prior to preparing for mounting the doors and windows. This helps to speed up the entire building process, since the doors and windows can be mounted at an early phase where the building is scaffolded due to the construction work with the inner walls.

[0011] By 'knockproof' or impact proof is understood a panel with a structure rigid enough to withstand normal weather conditions such as rain and snow and also be able to protect the door or window from normally occurring impacts during building construction work to avoid scratches, bumps and dents and the like on the door or window. Thus, the panel is capable of providing a significant further protection than a polymeric foil or the like. Further, the panel is preferably transparent or semi-transparent to at least allow a a large portion of daylight to enter the building, thus facilitating work in the interior part of the building without the use of electric light.

[0012] Especially in modern high insulation buildings with an inner wall and an outer wall with a rather large distance, where the inner wall in built before the outer wall, the method is advantageous since the doors and windows can be mounted at an early stage of the building construction. As soon as the inner wall is built, the doors and windows can be mounted therein before the construction of the outer wall begins, and due to the knockproof panels, the thermal insulation effect of the doors and windows is utilized for a long period. In case of large building, the permanent doors and windows can be mounted several months before they would normally be mounted, in case a normal interim sealing solution is provided.

[0013] Preferably, the method comprises mounting a knockproof side panel perpendicular to the front of the door or window, so as cover at least part of the frame structure of the door or window, preferably comprising covering the majority of the frame structure of the door or window. Especially, side panels can be mounted to cover all four frame sides of a normal rectangular window (three sides in case of a door). Hereby, an optimal protection of the door or window can be obtained.

[0014] As mentioned, it is preferred that the door or window is fastened to an inner wall of the building, prior to construction or finishing of the outer wall of the building. Thus, mounting the door or window and the knockproof panel just after the inner wall is built, an optimal thermal insulation of the interior of the building can be obtained.

[0015] In preferred embodiments, the method comprses mounting one or more fastening members arranged for fastening the knockproof panel in front of the door or window. E.g. at least one fastening member is mounted on each side of the window, or one fastening member may be mounted on each corner of the door or window such that the knockproof panel is mounted or fastened directly onto the front of the door of window. The fastening of the knockproof panel to the front of the door or window may be performed prior to mounting the door or window in the door or window opening. Thus, especially the door or window may be provided with the knockproof panel already at the door or window manufacturer. However, alternatively, the parts may be assembled on the building site just before mounting of the protected door and window on the building. As an alternative, the fastening of the knockproof panel in front of the door or window may be performed after mounting the door or window in the door or window opening.

[0016] It is to be understood that the knockproof panel in front of the door or window is meant to be removed after finishing parts of work related to construction of the building that could potentially damage the door or window, thus leaving the door or window uninfluenced by the building process.

[0017] It is to be understood that the knockproof panel is preferably mounted or fastened to the front of the door or window or to the building in a manner allowing it to be easily removed, such as allowing a user or operator to remove the panel by hand without the need for a tool. Especially, it may be preferred to re-use the knockproof panel, and thus preferably the knockproof panel is preferably mounted by means of fastening members or fittings that do not damage the panel.

[0018] In a second aspect, the invention provides a door or window system comprising

- a door or a window,
- a knockproof panel with an area arranged to protect a majority of a front of the door or window, such as arranged to protect the entire front of the door or window, and
- one or more fastening members arranged for being fastened to at least a wall of a building or to a frame of the door or window, wherein the one or more fastening members are arranged to fasten the knockproof panel in front of the door or window.

[0019] The same advantages apply as already explained for the first aspect, and the same explanation of the 'knockproof' or impact proof panel applies as well for the door or window system.

[0020] The one or more fastening means are preferably arranged to fasten the knockproof panel, preferably a rather thin plane plate or panel, directly to the front of the door or window, so as to occupy a minimum of extra space compared to the door or window alone.

[0021] The one or more fastening members are preferably arranged for being fastened to both of the frame of the door or window and to a wall of a building. Thus, the one or more fastening members, e.g. in the form of a specially designed metal fitting in one piece, is preferably arranged to both fasten the door or window to the wall of the building and to serve to fasten the knockproof panel to the front of the window. E.g. by the fastening members being attached to a side of the door or window

frame, so as to allow an invisible fastening member when seen from the front. Especially, the door and window may already from the manufacturer be mounted with a number of mounting fittings and with the knockproof panel already mounted. Thus, on the building site, such pre-protected door or window unit can easily be mounted to the wall of the building by means of screws, thereby building site. However, it is to be understood that existing doors and windows with wooden or aluminium frames can be used, where the fastening members and the knockproof panels are brought to the building site separately and mounted together either with the mounting of the door or window on the wall before mounting the knockproof panel onto the wall or window frame, or in reverse order.

[0022] In preferred embodiments, the one or more fastening members comprises a fastening mechanism allowing a user to fasten or to unfasten the knockproof panel by hand without a tool. This allows easy mounting, in case the knockproof panel is not already mounted from the manufacturer, and at least it allows easy removal of the knockproof panel, thus saving expensive working time. In a special embodiment, the one or more fastening members comprises a threaded part protruding in front of a plane constituted by the front of the door or window, wherein the one or more fastening members further comprises a screw member, such as a wing nut, arranged to engage with the threaded part so as to allow a user to fasten or to unfasten the knockproof panel by hand without a tool. More specifically, the threaded part protruding in front of the plane constituted by the front of the door or window may be arranged for being removed after use, thus leaving no visible remaining parts after the door or window has been finally joint to the wall, e.g. by an elastic joint. This may be achieved by the threaded part being arranged for being broken off a remaining part of the fastening member.

[0023] In preferred embodiments providing additional protection, at least a knockproof side panel is arranged for being mounted perpendicular to a front plane of the door or window, so as to protect at least a part of the frame of the door or window. Especially, knockproof side panels are provided to protect all frame sides of the door or window (normally four sides of a window, and three sides of a door).

[0024] The type of knockproof panel to be used for the front and also side panels may be a transparent or at least semi-transparent plane panel or plate. E.g. the panel may be a polycarbonatic plate, such as a dual layer polycarbonatic plate, or an acrylic plate, such as having a thickness of 2 mm to 20 mm. However, it is to be understood that the primary protection effect can be achieved by many different materials, also wooden panels, even though the transparent effect is preferred since it allows daylight to enter the interior of the building during the construction phase.

[0025] The first and second aspects may each be combined with any of the other aspects. These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE FIGURES

[0026] Embodiments of the invention will be described in more detail in the following with regard to the accompanying figures. The figures show one way of implementing the present invention and is not to be construed as being limiting to other possible embodiments falling within the scope of the attached claim set.

[0027] Fig. 1a-1d shows section sketches of different stages of construction of a building with the early mounting of a door or window according to the invention, and

[0028] Fig. 2 shows a section drawing of an embodiment with fastening means having a threaded portion with a wing nut for easy mounting and removing of knockproof front and side panels.

DETAILED DESCRIPTION OF AN EMBODIMENT

[0029] To allow an easy overview of the method and system according to the invention, Figs. 1a-d serve to explain, by means of one section sketches of embodiment, how the invention can be applied in the process of constructing a building, such as building a house in the form of a dwelling, an office building or the like. The illustrations of Figs. 1a-d show an example of a modern building design with a rather large distance between an inner wall and an outer wall, e.g. a brick wall, which is normal for buildings with a larger thermal insulation effect.

[0030] Fig. 1a shows the building at an early stage where only the inner wall IW is yet built, thus providing a window opening WO providing no thermal insulation between the interior of the building IN and the outside OUT.

[0031] Fig. 1b shows a first stage according to the invention, namely mounting of the window W which is determined for permanent installation in the building. The window is fastened to the inner wall IW with fastning means FM1, FM2, in principle as a normal means for mounting such window W on a wall IW. However, a knockproof polycarbonatic panel PP, e.g. a 5-15 mm thick, allows early mounting of the window W on the inner wall IW before an outer wall is built without the risk of damaging or even completely destroying the window W due to impacts during the remaining building process. Hereby, a high thermal insulation effect is achieved, thus helping to save energy for heating the interior IN of the building for drying and for ensuring an acceptable working temperature inside the building IN e.g. during a winter period where construction work is going. Energy for electric light inside the building IN can be saved, if the polycarbonatic panel PP is transparent or at least semi-transparent, since daylight can then enter the interior IN of the building.

[0032] Fig. 1c shows the building after the outer wall OW has finally been built and the brickwall structure

around the window openings has been finalized. The knockproof polycabonatic panel PP is still in place and has served to protect the window from impacts during the construction of the outer wall OW.

[0033] Fig. 1d shows the window W after the knockproof panel PP has been removed, and the window W is prepared for the final finish in the form of an elastic joint between its frame and the wall structure. Such joint may be introduced either before or after removal of the knockproof panel PP.

[0034] In the solution shown in Figs. 1a-d, only one knockproof panel PP is shown, namely one covering the entire front area of the window W, but it is to be understood that additional panels can also be provided to cover sides of frame of the window W, which is illustrated by example in Fig. 2.

[0035] Fig. 2 shows a section drawing of a specific embodiment of a rather simple fastening means or fitting means FM that serves to both fasten the window W to a wall WL of the building and at the same time serves to fasten a protection front panel PP1 and also a protection side panel PP2 to the window W. It is to be understood that only one fitting means FM member is show, but to fasten a window W, e.g. four or more fitting means FM members may be required. Preferably, the fitting means FM members are made of a metal of a type, such as know in the art.

[0036] The fitting means FM member has a 90° bend BD1, thus allowing fastening to a front side of the wall WL by means of a screw SC, while another part of the fitting means FM is fastened to the window frame F, e.g. a wooden frame, my means of spikes which are twisted or wrenched into engagement with the window frame F structure. However, the fitting means may alternatively be mounted to the window frame F by means of one or more screws. A small optional bend BD2 is provided to allow easier mounting of window plates. The 90° bend BD1 can also be omitted in case it is preferred to fasten the window W to an edge of the wall WL instead of the front of the wall WL.

[0037] The fitting means FM structure further comprises a threaded rod TR which is threaded at least on its distal end which protrudes in front of the frontal part of the window W. A wing nut WN with a corresponding thread allows a user to remove or mount the wing nut WN, thus fastening or releasing an angled hinge AH that serves to hold both the front panel PP1 and the side panel PP2, since the threaded rod TR is rigidly mounted to he remaining part of the fitting means FM. As seen, the threaded rod TR is connected to the further fitting means FM structure by a breaking part BP with a thin structure which is arranged for breaking by means of a pair of nippers or the like. This allows the protruding and thus visible part of the fitting means FM to be removed after the wing nut WN has been released and the panels PP1, PP2 have been removed, and thus preparing the finishing with an elastic joint or the like.

[0038] The protection side panel PP2 may specifically be of a thermal insulating material which can thus serve as a back stop for an elastic joint.

[0039] The illustrated solution is one example of many different specific solutions to be used for fastening of protection panels PP1, PP2. The threaded rod TR and the wing nut WN is only one specific solution which allows an easy mounting and removing of the panels PP1, PP2, and which is suited also for the window manufacturer to apply already in the manufacturing state of the window, thus providing a window unit which is already protected and ready to mount on a wall.

[0040] Other solutions to possibly replaced the threaded rod TR and wing nut WN are: snap fits or snap locks or clip fits or clip lock mechanisms. However, it is to be understood that in principle other mounting solutions requiring tools may alternatively be used.

[0041] The actual design of a one-piece fastening member or fitting means should preferably be selected to match the actual design of the frame of the door or window.

[0042] It may be preferred to provide one knockproof panel sized to fit the entire front of the door or window, but with the angle hinge AH shown in Fig. 2, it is possible to combine two or even more layers of panels with different dimensions, such that it is possible to cover the entire or at least a large part of the front area of the door or window with partly overlapping panels kept in place by the force provided by the angle hinge AH. This allows use of rather small panels which can still be combined to cover a variety of door and window dimensions. Hereby, time required to cut panels to the correct dimension of the door or window can be saved.

[0043] If preferred, the front of the knockproof panel may be provided with commercials or other information or decoration.

[0044] To sum up, the invention provides a method for sealing a door or window opening of a building under construction. A door or window is mounted in the door or window opening so as to seal the opening during a further construction phase of the building. The door or window is the component which is actually intended for permanent installation in the door or window opening. Further, a removable knockproof panel, such as a transparent or semi-transparent polymeric panel, is mounted in front of the door or window, such as covering the entire front of the door or window. Hereby, the door or window front is protected in the building construction phase. This eliminates the need for interim sealing solutions using wooden structures and plastic foils and the like. Compared to existing methods, energy is saved to heating of the interior of the building during the construction phase, because the high thermal insulation effect of the permanent door or window is provided at an early stage. The knockproof panel may be a transparent 2-20 mm thick polycarbonatic plate. One or more further panels may be arranged to protect sides of the door or window. A combined fitting means may be used to both mount the door or window in the opening, and to fasten the knockproof panel in a

removable way so as to allow easy removal from the knockproof panels. This allows the protective panels to be mounted by the door or window manufacture for easy installation at the building site.

[0045] Although the present invention has been described in connection with the specified embodiments, it should not be construed as being in any way limited to the presented examples. The scope of the present invention is set out by the accompanying claim set. In the context of the claims, the terms "comprising" or "comprises" do not exclude other possible elements or steps. Also, the mentioning of references such as "a" or "an" etc. should not be construed as excluding a plurality. The use of reference signs in the claims with respect to elements indicated in the figures shall also not be construed as limiting the scope of the invention. Furthermore, individual features mentioned in different claims, may possibly be advantageously combined, and the mentioning of these features in different claims does not exclude that a combination of features is not possible and advantageous.

Claims

1. A method for sealing a door or window opening of a building under construction, the method comprising

   - mounting a door or window in the door or window opening so as to seal the opening during a further construction phase of the building, wherein the door or window is arranged for permanent installation in the door or window opening, and
   - mounting a removable knockproof panel, such as a transparent or semi-transparent polymeric panel, in front of the door or window, so as to protect at least a majority of a front area of the door or window, preferably covering the entire front of the door or window.

2. Method according to claim 1, comprising mounting a knockproof side panel perpendicular to the front of the door or window, so as cover at least part of the frame structure of the door or window, preferably comprising covering the majority of the frame structure of the door or window.

3. Method according to claim 1 or 2, wherein the door or window is fastened to an inner wall of the building, prior to construction or finishing of the outer wall of the building.

4. Method according to any of the preceding claims, comprising mounting one or more fastening members arranged for fastening the knockproof panel in front of the door or window.

5. Method according to claim 4, comprising fastening the knockproof panel to the front of the door or window prior to mounting the door or window in the door or window opening.

6. Method according to claim 4, comprising fastening the knowckproof panel in front of the door or window after mounting the door or window in the door or window opening.

7. Method according to any of the preceding claims, comprising removing the knockproof panel in front of the door or window after finishing parts of work related to construction of the building that could potentially damage the door or window.

8. A door or window system comprising

   - a door or a window,
   - a knockproof panel with an area arranged to protect a majority of a front of the door or window, such as arranged to protect the entire front of the door or window, and
   - one or more fastening members arranged for being fastened to at least a wall of a building or to a frame of the door or window, wherein the one or more fastening members are arranged to fasten the knockproof panel in front of the door or window such that the knockproof panel can be removed.

9. Door or window system according to claim 8, wherein the one or more fastening members are arranged for being fastened to both of the frame of the door or window and to a wall of a building.

10. Door or window system according to claim 8 or 9, wherein the one or more fastening members comprises a fastening mechanism allowing a user to fasten or to unfasten the knockproof panel by hand without a tool.

11. Door or window system according to any of claims 8-10, wherein the one or more fastening members comprises a threaded part protruding in front of a plane constituted by the front of the door or window, wherein the one or more fastening members further comprises a screw member, such as a wing nut, arranged to engage with the threaded part so as to allow a user to fasten or to unfasten the knockproof panel by hand without a tool.

12. Door or window system according to claim 11, wherein the threaded part protruding in front of the plane constituted by the front of the door or window is arranged for being removed after use, such as the threaded part being arranged for being broken off a remaining part of the fastening member.

13. Door or window system according to any of claims 8-12, comprising at least a knockproof side panel arranged for being mounted perpendicular to a front plane of the door or window, so as to protect at least a part of the frame of the door or window.

14. Door or window system according to any of claims 8-13, wherein the knockproof panel is transparent or at least semi-transparent.

15. Door or window system according to any of claims 7-14, wherein the knockproof panel comprises one of: a polycarbonatic plate such as a dual layer polycarbonatic plate, or an acrylic plate, such as having a thickness of 2 mm to 20 mm.

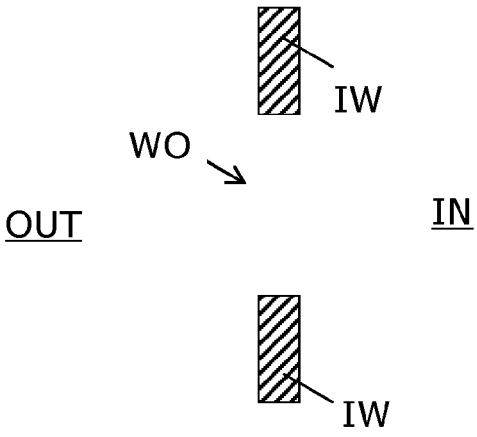

Fig. 1a

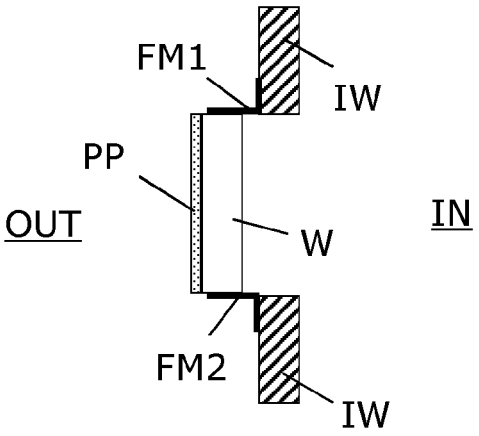

Fig. 1b

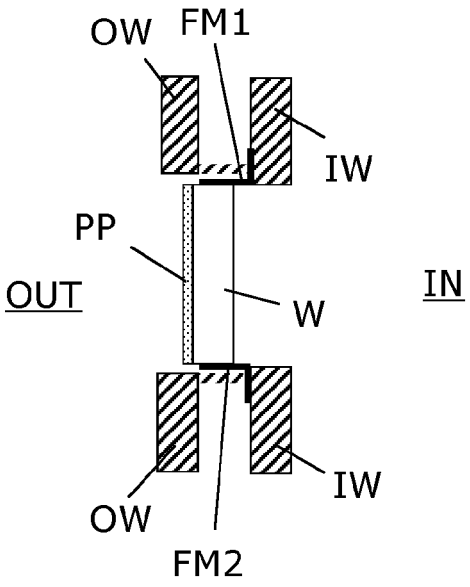

Fig. 1c

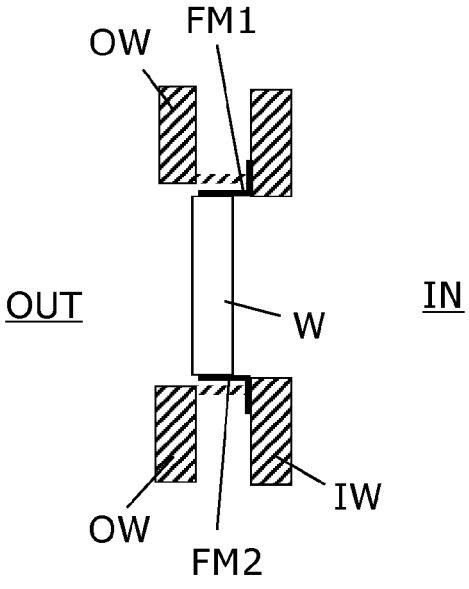

Fig. 1d

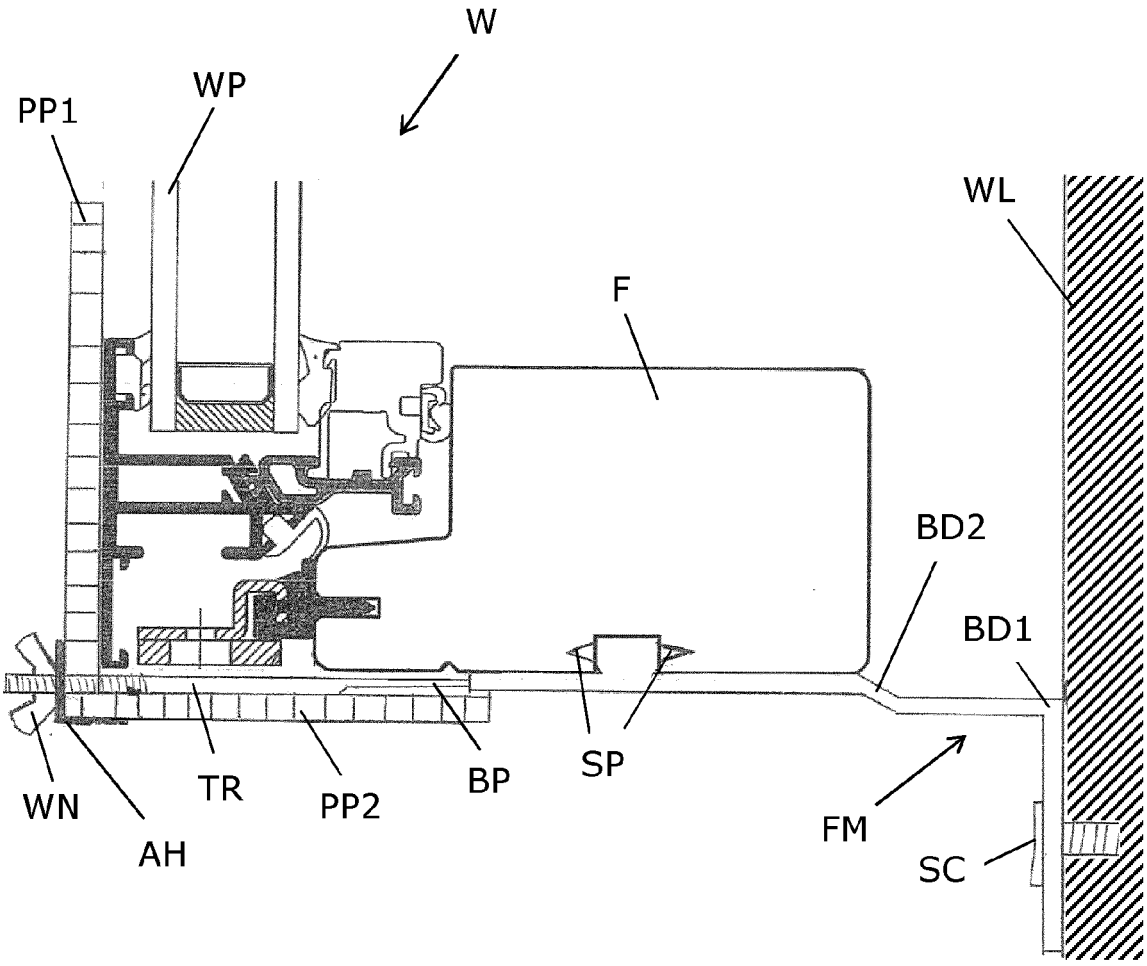

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 11 19 4902

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	WO 2007/007044 A1 (WATERTIGHT INTERNAT LTD [GB]; TUCKER JASON [GB]) 18 January 2007 (2007-01-18) * abstract; figures 1-4 *	1,2,4,6, 8,10-15	INV. E06B1/56
X	BE 333 050 A (GYBELS HENRI ET BRENSKY BERNARD) 30 April 1926 (1926-04-30) * page 2; figures 1,2 *	1,2,4,6, 8-15	
A	US 2008/271394 A1 (HAND RICHARD S [US] ET AL) 6 November 2008 (2008-11-06) * paragraph [0033]; figure 2 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 May 2012	Kofoed, Peter

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 19 4902

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