



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.02.2021 Bulletin 2021/08

(51) Int Cl.:
E04C 3/09 (2006.01) **E04C 3/28** (2006.01)
E04B 1/94 (2006.01) **E04B 2/74** (2006.01)
E04C 3/04 (2006.01)

(21) Application number: **20201556.6**

(22) Date of filing: **14.08.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

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(30) Priority: **14.08.2014 EP 14181047**

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(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
15753894.3 / 3 180 481

Remarks:
This application was filed on 13-10-2020 as a divisional application to the application mentioned under INID code 62.

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(54) **AN OUTER FRAME ELEMENT, A SET OF PARTS, A WALL CONSTRUCTION AND A METHOD FOR MOUNTING THE WALL CONSTRUCTION**

(57) A fire-shielding U-shaped outer frame element adapted for supporting a side of at least one wall element in a wall construction, said outer frame element being elongate and comprising a bottom part and a first side flange and a second side flange extending at an angle to the bottom part, interior surfaces of the side flanges being adapted for extending along exterior surfaces of the wall element. The outer frame element (1) comprises

a plurality of perforations (15) and a first elongate strip (16) of a material having thermal shielding properties and being arranged on a surface of the first and/or second side flange (13, 14) of the outer frame element (1) so as to shield the wall element from heat from a fire. A set of parts include an outer frame element and a fastenings means for use between wall elements when making a wall construction.

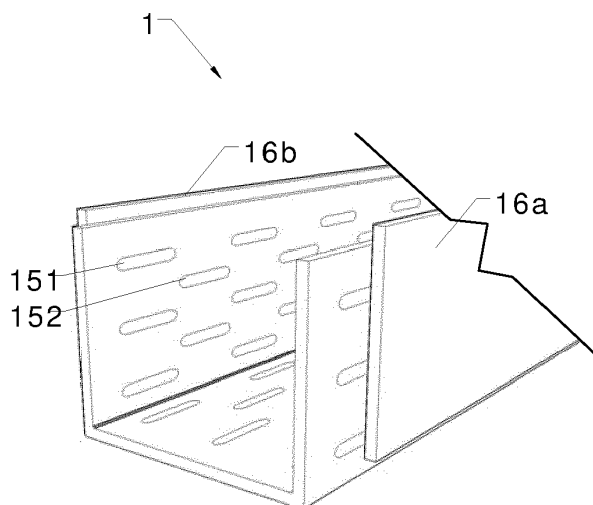


Fig. 1b

Description

Field

[0001] The present invention relates in a first aspect to a fire-shielding U-shaped outer frame element adapted for supporting a side of at least one wall element in a wall construction. The invention also relates in a second aspect to a set of parts comprising a fire-shielding U-shaped outer frame element, in a third aspect to a wall construction comprising a set of parts, and in a fourth aspect to a method for mounting a wall construction.

Background

[0002] The need for a good and reliable fire protection system in commercial buildings and office complexes has gained significant importance in recent years. Fire and fire-related hazards can cause heavy loss to life, property and critical data.

[0003] Modern technology permits the use of glass in walls without compromising fire safety standards, since incorporation of fire-rated glass is possible. Fire-rated glass is suitable for use for example in stairwells, computer rooms, evacuation routes in large office buildings, hospitals, shopping centres and other fire sensitive areas. Such glass walls help to prevent flames, smoke and hot gases from spreading.

[0004] When wall elements, such as glass wall elements, are assembled to form a wall construction, including partition walls, folding partitions, panel walls etc., an outer frame is used to support the wall elements, the frame being connected to the adjacent floor, ceiling and/or walls, and sometimes to each other. The outer frame may consist of a variety of materials, most common are aluminium, stainless steel or wood, depending on the desired properties of the frame.

[0005] US 8,793,947 discloses an example of a U-shaped fire-rated wall construction component comprising flanges with openings and a fire-retardant material covering said openings, where the fire-retardant material during a fire will expand through the openings and key onto the flange.

[0006] Unfortunately the above prior art frame elements have a number of drawbacks. During a fire these outer frames can act as a thermal bridge allowing heat to quickly spread to the other side of the wall construction potentially starting a fire on the other side of the wall, even when the wall elements are constituted by fire-rated glass. Further, heat from the fire may result in deformation of the frames and the entire wall construction may become unstable with a risk of collapsing.

[0007] Especially when it comes to the joining of the different wall elements to each other, different initiatives have been taken to try to obtain a higher fire-shielding effect. This often results in bulky and un-aesthetic solutions, which are undesirable, particularly in glass wall constructions, which are often chosen for their aestheti-

cal properties. Further these solutions are often very complex and therefore expensive to manufacture and/or difficult to install.

[0008] Thus, it remains a problem to provide an outer frame element for wall constructions that has improved fire-shielding properties and which is suitable for use in glass walls.

Summary of the invention

[0009] With the first aspect of the invention this object is met by providing a fire-shielding U-shaped outer frame element adapted for supporting a side of at least one wall element in a wall construction, said outer frame element being elongate in a longitudinal direction and comprising a bottom part and a first side flange and a second side flange, the first and second side flanges extending at an angle to the bottom part and away from the bottom part in a height direction, an interior surface of the first side flange being adapted for extending along a first exterior surface of the wall element and an interior surface of the second side flange being adapted for extending along a second exterior surface opposite the first exterior surface of the wall element in a mounted condition of the outer frame element so as to hold the wall element to form said wall construction, wherein the outer frame element comprises a first elongate strip and a plurality of perforations in the bottom part, first side flange and/or second side flange, said first strip comprising a material having thermal shielding properties and being arranged on an interior and/or exterior surface of the first side flange and/or second side flange of the outer frame element so as to shield the wall element from heat from a fire.

[0010] By providing a U-shaped outer frame element comprising a plurality of perforations, the outer frame element has a smaller heat transfer surface than if it was made without perforations, whereby less heat from a fire will be transferred both from one side of the wall to the other, but also from the outer frame element to the wall element itself.

[0011] Further, the plurality of perforations can absorb deformations occurring in the outer frame element during a fire. This is advantageously because the side of the outer frame element facing the fire, also referred to as the hot side, will deform more than the side of the outer frame element being farthest from the fire, also referred to as the cold side. When the outer frame element is able to absorb such deformations, the wall construction is less likely to become unstable and collapse.

[0012] The plurality of perforations may be of any desirable shape such as for example circular, rectangular, trapezoid or parallelogram. In some embodiments the perforations are elongate in the longitudinal direction of the outer frame element, thereby providing a good balance between the amount of material available for heat transfer and the strength and stiffness of the outer frame element.

[0013] In some embodiments the outer frame element

is composed of at least two separate components including a base element and an adaptor element forming at least a first part of the second side flange.

[0014] By providing the outer frame element being composed of at least two separate components, mounting of the outer frame element on the wall element is less demanding thus facilitating more possibilities for when in the installation process the outer frame element has to be mounted. By first mounting the base element without the adaptor element, the wall element can easily be inserted to abut the inner side of the first side flange. When afterwards attaching the adaptor element to the base element the U-shaped outer frame element is assembled and keeps the wall element in place. It is, however, also possible to provide the base element and adaptor element in an already interconnected state, where they are able to move in relation to each other so as to ease installation of the wall element.

[0015] In some embodiments the outer frame element further comprises an attachment element for fixing the base element and the adaptor element to each other, but it is also possible to interconnect them by means of a glue or adhesive.

[0016] The attachment element may be provided as separate elements, but in some embodiments the attachment element is provided on the base element, for example in the form of a projecting flange, which can be bent over an edge of the adaptor element. In some embodiments the adaptor element comprises at least one perforation adapted for receiving the attachment element. The attachment element may be embodied so that it can be expanded after being inserted through the perforation or a separate fixation member, such as a nut or peg, may be attached to the attachment element to prevent it from being pulled back out through the perforation upon insertion.

[0017] The dimensions of the attachment element may vary according to the type of perforation and outer frame element to be used in the wall construction and to conform with the dimensions of and expected loads on the wall.

[0018] In some embodiments the base element comprises the bottom part, the first side flange and a second part of the second side flange. The second part of the second side flange may then provide a point of attachment for the adaptor element and/or it may contribute to supporting the wall element and/or guide the wall element during installation.

[0019] In some embodiments the second part of the second side flange formed by the base element is shorter than the first side flange in the height direction. Typically the height will correspond to the height of one or more spacer element(s) provide between the first and second flanges to keep the wall element at a distance above the bottom part to allow thermal expansion of the wall element. In most wall constructions, two spacer elements are used for each wall element.

[0020] The spacer element(s) may also function as

supporting element(s) for supporting the wall element. The spacer element may support some of the weight of the wall element.

[0021] Two-part outer frame elements and/or spacer elements may be used at all edges of the wall element, but it is also possible to use two-part outer frame elements and/or spacer elements only at one or some sides, while other embodiment(s) of the outer frame element is/are used at other side(s).

[0022] In some embodiments the distance between the first side flange and the second part of the second side flange in a width direction is smaller than the width of the wall element, which the U-shaped outer frame element is intended to receive. This ensures that the side edge of the wall element cannot be inserted all the way to the bottom part of the outer frame element, but will instead come to rest on or abut the top of the second part of the second side flange, thereby ensuring an air gap between the wall element and the bottom part. Such an air gap may for example be desired in order to allow thermal expansion.

[0023] In some embodiments the adaptor element comprises first section and a second section, said first section being adapted for extending along the second part of the second side flange and said second section being adapted for extending along the second exterior surface of the wall element, and wherein the first and second sections are off-set in relation to each other in a width direction, so that a width between the first side flange and the first section is smaller than a width between the first side flange and the second section in an assembled condition of the outer frame element.

[0024] By providing the off-set sections and applying any attachment elements at the first section, the attachment element will not protrude beyond the level of the second section, thus providing a more uniform surface for attaching e.g. elongated strips with thermal shielding properties on the outer side of the second flange.

[0025] In some embodiments the adaptor element has substantially the same length in the longitudinal direction as the base element, thereby providing an outer frame element with a well-defined length.

[0026] The adaptor element and base element may have any length suitable for the wall element on which they are intended to be mounted on, for example corresponding to the length or height of the wall element.

[0027] In some embodiments in the assembled condition of the outer frame element, the second side flange has substantially the same height as the first side flange.

[0028] By providing the first and second side flanges with substantially equal height, cost effective production is enabled since the same types of cover profiles may be utilised on both sides of the wall element.

[0029] In some embodiments, the plurality of perforations are arranged in at least two rows extending in a longitudinal direction of the outer frame element. In some embodiments the perforations of one row are staggered with respect to adjacent perforations of another row. In

some embodiments, the plurality of perforations are arranged in at least two rows extending in a longitudinal direction of the outer frame element, perforations of one row are staggered with respect to adjacent perforations of another row. By placing the perforations of one row staggered with respect to the adjacent rows, and so on for each row, the heat from the fire has a longer route from one side of the outer frame element to the other. Thereby the time period until the heat reaches the other side of the wall is prolonged. Likewise, sound will have a longer route from one side to the other of the outer frame element.

[0030] The outer frame element may be made from a material chosen from the group consisting of aluminium, steel, alloys, composites, carbon fiber and/or glass fiber or made from a combination of such materials, but any material having a high strength and a high melting point may in principle be used. The use of materials having a low thermal conductivity may also be advantageous.

[0031] The dimensions of the outer frame element may vary according to the type of cover profiles and wall elements to be used in the wall construction. Different types of fire-rated glass used in the wall element will work differently, which may be adjusted for in the outer frame elements.

[0032] In some embodiments the outer frame element may have a length of 0.75 to 1.25 m, preferably 0.90 to 1.10 m, more preferred approximately 1 m. The material thickness will typically be approximately 0.5-5 mm depending on the material used, typically approximately 1 mm when using steel. The height of the first and second side flanges in the direction perpendicular to the longitudinal direction, i.e. in the direction away from the bottom part will typically be approximately 10-50 mm, preferably approximately 15-30 mm. The distance between the side flanges will correspond substantially to the width of the wall elements, typically 5-100 mm and more specifically 16-50 mm.

[0033] The outer frame element may be attached to adjacent walls, ceilings and/or floors by fastening means, such as nails, screws, staples, adhesive, etc.

[0034] One outer frame element may be in contact with two or more wall elements at the same time, covering the gaps between the wall elements.

[0035] In some embodiment, the U-shaped outer frame element further comprises a second elongate strip comprising a material having thermal shielding properties, the second strip being arranged on an interior and/or exterior surface of the bottom part of the outer frame element so as to shield the wall element from heat from a fire.

[0036] By providing an outer frame element comprising a first elongate strip and/or a second elongate strip, a desirable heat-shielding barrier is obtained, further preventing heat from the fire from spreading from one side of the wall element to the other side, and also from the outer frame element to a side of the wall element. As used herein the terms "prevent/preventing" and

"shield/shielding" is intended to refer to the effect of acting as a barrier that postpones the heat from transferring from one side to another or from one element to another.

[0037] The delay in the spreading of heat/fire will depend on the material of the strips.

[0038] In some embodiments the first and/or second elongate strip may be made from a material having thermal shielding properties, such as magnesium silicate, and/or intumescent properties, such as ammonium phosphate, including mixtures thereof. The first and/or second strip may comprise additional materials such as adhesives for attaching the strip to the outer frame element or interconnecting different layers of material.

[0039] As used herein the term "intumescent" is intended to refer to the effect of swelling up when heated, thus protecting the material underneath or sealing a gap in the event of a fire.

[0040] By providing a second strip having intumescent properties on the interior and/or exterior surface of the bottom part, any gap between the outer frame element and an adjacent floor, wall or ceiling and/or between the outer frame element and the wall element(s) will be sealed during a fire. This will shield the outer frame element and help in preventing heat from the fire from reaching from one side of the wall construction to the other side.

[0041] Thermal shielding properties of the first and/or second strip may arise from a cooling effect caused primarily by the materials emission of water vapour during high temperatures.

[0042] The type of material chosen for the first and/or second strip and the position of the strip(s) will also depend on the type of material used in the wall element, since for example some types of glass may have a build-in intumescent effect in the glass edge.

[0043] The first and/or second strip may be attached to the outer frame element by means of mechanical means, such as screws, nails, staples or the like, and/or a high-temperature adhesive. By using a high-temperature resistant adhesive, the adhesive may also function as a heat-shield thereby improving the total heat-shielding properties of the strip. Further, the use of high-temperature resistant adhesive and/or mechanical means will ensure that the strip stays attached to the outer frame element during a fire.

[0044] The first strip may extend over substantially the entire interior and/or exterior surface of the first side flange and/or the second side flange of the outer frame element. By providing a strip that covers an entire surface of a side element, the heat-shielding properties of the entire outer frame element is improved.

[0045] By positioning the outer frame element comprising the first and/or second strip at desired positions, extra protections can be provided at specific areas where this protection is desired, such as corners, openings and/or wall transitions. A similar effect may also be achieved by using outer frame element(s) extending substantially along the entire side of a wall element and arranging the first and/or second strip(s) only at positions, where pro-

tection is most needed.

[0046] In some embodiments, a finishing element, such as a facing profile or list, may be arranged on the first strip and/or the exterior surface of the side flange. The finishing element may have a variety of different shapes to give the finished wall construction different expressions depending on customer desire.

[0047] In a second aspect the invention involves a set of parts having fire-shielding properties for assembly of a first and a second wall element into a wall construction, bringing the set of parts from an inactive supply condition to an active mounted condition, the set of parts comprising: a fire-shielding U-shaped outer frame element as described above, the outer frame element being adapted for supporting a side of the first and/or second wall element, and a fastening means adapted for being arranged between the first and second wall elements, so as to hold the first and second elements together to form said wall construction.

[0048] As used herein the term "inactive condition" refers to the state where the different elements are unassembled. The term "active (mounted) condition" refers to the assembled state of the different elements.

[0049] By providing fastening means for establishing support between the first and second wall elements together with the outer frame element, an even more stable wall construction is obtained, where the fastening means may provide further improved safety with regards to the heat from the fire being transferred from one side of the wall construction to the other side.

[0050] In a simple embodiment, the fastening means is a material having fire-shielding properties, such as an adhesive or like bonding compound, including silicone, but the fastening means may also comprise a second fire-shielding material, such as a band of magnesium silicate.

[0051] By providing the fastening means with fire-shielding materials, the fire-shielding properties of the fastening means and thereby the set of parts is increased.

[0052] In some embodiments the fire-shielding fastening means comprises a fastening element comprising: an elongate base part having a first end and a second end, a holding part connected to the first end of the base part, a fixation part connected to the second end of the base part, the fixation part comprising a first fixation arm and a second fixation arm, the base part and the fixation part extending, in the inactive condition, in the same plane, wherein the fastening element is adapted for being arranged in said active mounted condition with the base part positioned between the first and second wall elements, the holding part extending at an angle to the base part and extending along first exterior surfaces of the first and/or second wall elements, the first and second fixation arms extending at an angle to the base part and extending along a second exterior surface of the first and/or second wall element, so as to hold the first and second wall elements together to form said wall construction.

[0053] As used herein the term "extending along" is to

be understood as objects being in planes that are substantially parallel and close to each other.

[0054] The base part is to be understood as the part of the fastening element that in the active mounted condition is positioned between the wall elements. An elongate slit in the fixation part may separate the fixation part into the first and the second fixation arms. The slit may continue into the base part and/or extend all the way from the fixation part to the holding part.

[0055] In some embodiments, in the inactive condition, the holding part is U-shaped comprising a head part and two arms, the head part being connected to the first end of the base part and the two arms extending along opposite sides of the base part in a longitudinal direction of the base part.

[0056] In the active mounted condition, the holding part and the base part may extend in respective planes forming a mutual angle of 80° to 100°, preferable 85° to 95°, more preferred approximately 90°, and/or the first fixation arm and the base part may extend in respective planes forming a mutual angle of 80° to 100°, preferable 85° to 95°, more preferred approximately 90°, and/or the second fixation arm and the base part may extend in respective planes forming a mutual angle of 80° to 100°, preferable 85° to 95°, more preferred approximately 90°, and/or the holding part and the first and second fixation arms may extend in parallel planes.

[0057] The fastening element being in its inactive condition may for example be made by a process of punching one single work-piece out from a single sheet of plate metal (or like material) and then folding and/or bending the work-piece into the active mounted condition of the fastening element. Hereby, a time-consuming process of assembling several parts to form the fastening element is avoided. It should be noted that it is alternatively possible to for example cast or mould the fastening element in one integral piece to avoid assembly or reshaping of the fastening element.

[0058] A bendable fastening element may be made from any suitable material, with any suitable thickness as long as the material is deformable and maintains the desired strength to hold the wall elements in place. For example the fastening element may substantially be constituted by sheet metal, preferably sheet steel, but other materials having similar cold deformation properties and a high melting point may also be used.

[0059] In order to make the gap between the wall elements as small as possible and to reduce the amount of material, which may lead heat from one side of the wall to the other, the fastening element is preferably of a very slim construction, preferably plate shaped. When using steel the fastening element may be provided with a thickness of 0.3 to 11 mm, preferably 0.5 to 0.9 mm, more preferred 0.7 mm. This can also be a positive quality with regards to sound isolation. The dimensions of the fastening element may also vary according to the type of cover profiles and wall elements used.

[0060] The fastening element may also be provided

with pre-tensioned fixation arms being able to snap into place when the fastening element is mounted.

[0061] The holding part of the fastening element may be provided with a rounded head resembling the head of a nail in order to allow a good load distribution on the surface(s) it abuts on. The holding part may, however, also be in the form of one of more flanges, which may possibly be bent in situ in connection with the mounting of the fastening member.

[0062] In the active mounted condition the first fixation arm and the second fixation arm may extend in mutually opposite directions in order to achieve a particularly stable connection and distribute pressure. In the active mounted condition of the fastening element, the first and second fixation arms will usually extend in the same plane.

[0063] In some embodiments the fastening means further comprises: a first and a second cover profile each comprising at least one longitudinal elongate slot, the first cover profile being adapted for extending along the first exterior surfaces of each of the first and second wall elements at the joint between them in a mounted condition, the second cover profile being adapted for extending along the second exterior surfaces opposite the first exterior surfaces of each of the first and second wall elements at the joint between them in a mounted condition, where the first end of the base part extending through the at least one slot of the first cover profile and the second end of the base part extending through the at least one slot of the second cover profile, the holding part extending at an angle to the base part and extending along an exterior surface of the first cover profile, and the first and second fixations arms extending at an angle to the base part and extending along an exterior surface of the second cover profile, so as to hold the first and second cover profiles and first and second wall elements together to form said wall construction.

[0064] By providing the cover profiles between the fastening element(s) and the wall elements a more uniform load distribution will be applied to the wall elements, thereby creating a stable wall construction with improved fire-shielding properties with a minimal use of material.

[0065] When the cover profiles cover a substantial part of the gap between neighbouring wall elements, heat is further prevented from reaching from one side of the wall construction to the other during a fire. This can also be a positive quality with regards to sound isolation.

[0066] The dimensions of the slots of the cover profiles may vary according to the size and shape of the different parts of the fastening element. By providing slots that are wider than the width of the base part of the fastening element, it is possible for the cover profile to absorb deformation of the connection and widening of the fastening element that may occur during a fire.

[0067] The cover profiles may have corner flanges which are extending at approximately 90° towards the exterior surfaces of the wall elements in the mounted condition. Thereby the cover profiles can hold a fire-

shielding material between an interior surface of the cover profile and the exterior surface of the wall elements. The corner flanges may abut the exterior surface of the wall elements.

[0068] A finishing element, such as a facing profile, may be provided for covering the fastening means including the cover profiles if any. The finishing element may have a variety of different shapes to give the finished wall construction different expressions depending on customer desire.

[0069] In some embodiments the outer frame element is composed of at least three separate components including a base element, an adaptor element and an attachment element for fixating the base element and adaptor element to each other, wherein said attachment element is embodied as the fastening element described above and wherein said base element and said adaptor element are each provided with at least one perforation adapted for receiving the attachment element.

[0070] In a third aspect the invention involves a wall construction having fire-shielding properties and comprising a set of parts according to the second aspect, the wall construction further comprising at least two wall elements assembled to form a wall construction by means of the set of parts, said wall elements being held in place by the set of parts and the U-shaped outer frame element.

[0071] In some embodiments the wall construction comprises at least two fastening elements mounted such that the holding part of a first fastening element is located on one side of the wall elements and the holding part of the second fastening element is located on the opposite side of the wall elements.

[0072] By providing at least two fastening elements, a more stable wall construction is obtained, the fastening elements providing a more equal pressure to the wall elements and cover profiles, if any. Having the holding parts of different fastenings elements on opposite sides of the wall construction provides symmetry to the wall construction, so that both sides of the wall construction will react substantially in the same way to a fire.

[0073] In some embodiments the wall construction comprises at least a first, a second and a third cover profile, the first and third cover profiles extending along the first exterior surfaces of the wall elements, and the second cover profile extending along the second exterior surfaces opposite the first exterior surfaces of the wall elements, the at least three cover profiles being arranged such that a first fastening element connects to the first and second cover profiles and a second fastening element connects to the second and third cover profiles.

[0074] By providing at least three cover profiles, which are staggered in relation to each other, extra stability of the wall construction is provided.

[0075] The dimensions of the cover profiles element may vary according to the type of fastening elements and wall elements. In some embodiments, the cover profile may be provided with a length corresponding to 0.75 to 1.25 m, preferably 0.90 to 1.10 m, more preferred 1 m.

Their width will depend on the size of the wall elements and the fastening means used, but will typically be 15-50 mm, preferably 25-30 mm.

[0076] Cover profiles and U-shaped outer frame elements arranged on the same side of the wall elements may be arranged at a distance from each other in the active mounted condition, so that the profiles/elements will be able to expand and to absorb the expansion of the glass, which might curve outwards during a fire putting extra pressure on the profiles and/or elements. Further, the heat transfer from one profile/element to another will be significantly reduced. When using metal profiles/element said distance may be 1 to 10 mm, preferably 3 to 7 mm, more preferred approximately 5 mm.

[0077] Alternatively, the cover profiles and/or U-shaped outer frame elements may be mounted with an overlap between edges of adjacent profiles/elements, the overlapping sections possibly having reduced thickness.

[0078] In some embodiments the outer frame element is composed of at least two separate components including a base element and an adaptor element, where the adaptor element forms at least a first part of the second side flange and the base element comprises a second part of the second side flange, and wherein the distance between the first side flange and the second part of the second side flange in a width direction is smaller than the width of the wall element.

[0079] In some embodiments the wall elements are made from glass, preferably fire-rated glass. Hereby the entire thermal bridging effect of the wall construction is minimized.

[0080] In a fourth aspect the invention involves a method for mounting a wall construction having fire-shielding properties comprising the steps of:

providing a set of parts as described above for assembly of a first and a second wall element into a wall construction,
arranging the U-shaped outer frame element on a side of the first and/or second wall element,
positioning the fastening element being in its inactive condition such that the base part is positioned between the first and second wall elements,
arranging the holding part such that it extends along a first exterior surface of each of the first and second wall elements, and
bending the first and second fixations arms, so that the first and second fixations arms extend along a second exterior surface opposite the first exterior surface of each of the first and second wall elements, so as to hold the wall elements together to form said wall construction.

[0081] In some embodiments the method further comprising the steps of:

arranging a first cover profile such that it extends

along the first exterior surface of each of the first and second wall elements,

arranging the second cover profile such that it extends along the second exterior surface of each of the first and second wall elements,

positioning the fastening element being in its inactive condition such that the first end of the base part extends through the slot of the first cover profile and the second end extends through the slot of the second cover profile and the base part being positioned between the first and second wall elements,

arranging the holding part such that it extends along an exterior surface of the first cover profile, and bending the first and second fixations arms, so that the first and second fixations arms extend along the exterior surface of the second cover profile, so as to hold the first and second cover profiles and wall elements together to form said wall construction.

[0082] The different aspects of the present invention can be implemented in different ways, each yielding one or more of the benefits and advantages described in connection with at least one of the aspects described above, and each having one or more preferred embodiments, including the embodiments described in connection with at least one of the aspects above and/or disclosed in the dependent claims.

Brief description of the drawings

[0083] Objects, features and advantages of the present invention will be further outlined by the following illustrative and non-limiting detailed description of embodiments of the present invention, with reference to the appended drawings, wherein:

Figure 1a shows a perspective view of an outer frame element without fire-shielding strips,

Figure 1b shows a perspective view of an outer frame element according to an embodiment of the first aspect of the invention,

Figure 1c shows an end view of an outer frame element with only a second fire-shielding strip,

Figure 2 shows a top view of a cover profile,

Figure 3a shows a top view of a fastening element according to an embodiment of the invention in inactive condition,

Figure 3b shows a perspective view a fastening element according to an embodiment of the invention in active condition,

Figure 3c shows a schematic view of a fastening element as in Fig. 3b from a different angle,

Figure 4 shows a horizontal sectional view of a set of parts in an active mounted condition,

Figure 5 shows a perspective sketch of another set of parts according to the second aspect of the invention,

Figure 6 shows a perspective view of U-shaped outer

frame elements on a wall construction according to a third aspect of the invention,
 Figure 7 shows a perspective view of a base element,
 Figure 8 shows a perspective view of an adaptor element,
 Figure 9 shows a perspective view of an outer frame element in an unassembled condition according to an embodiment of the first aspect of the invention,
 Figure 10 shows a perspective view of an outer frame element in an assembled and mounted condition on a wall element, and
 Figure 11 shows a perspective view of an outer frame element on a wall construction according to the third aspect of the invention.

Detailed description

[0084] In the following description reference is made to the accompanying figures, which show by way of illustration how the invention may be practiced. Note that for illustrative purposes the dimensions, especially thicknesses, of the different elements shown may be exaggerated.

[0085] Figure 1a shows a fire-shielding U-shaped outer frame element 1 adapted for supporting a side of at least one wall element in a wall construction. The outer frame element 1 comprising a bottom part 12, a first side flange 13 and a second side flange 14. The first side flange 13 and the second side flange 14 extending at an angle to the bottom part 12 in a height direction h. The bottom part 12 extends between the first side flange 13 and the second side flange 14 in a width direction w.

[0086] The first side flange 13 comprises an interior 131 and an exterior 132 surface and the second side flange 14 comprises an interior 141 and an exterior 142 surface, the interior surfaces 131, 141 being arranged opposite each other. The outer frame element 1 is elongate and the side flanges extend in a longitudinal direction A of the outer frame element along the longest side of the bottom part 12. The interior surfaces 131, 141 of the side flanges 13, 14 are adapted for extending along opposite exterior surfaces of the wall element(s) (not shown) in a mounted condition of the outer frame element 1.

[0087] The first side flange 13 and the bottom part 12 extend in respective planes forming a mutual angle of approximately 90° and the same applies to the second side flange 14 with respect to the bottom part. Here the first side flange 13 and second side flange 14 extends in parallel planes, but the side flanges may also extend at an angle of less than approximately 90° to the bottom part in an inactive condition so as to project towards each other. If the opening between the side flanges has a width smaller than the thickness of the wall element, the side flanges will be forced away from each other during mounting of the wall construction, preferably to extend at an angle of approximately 90° with the bottom part in an active mounted condition. This will result in the side flang-

es applying pressure on the wall element(s) in the mounted condition, whereby the outer frame element may fixate itself to the wall element(s).

[0088] The outer frame element 1 comprises a plurality of perforations 15 arranged in a plurality of rows extending in the longitudinal direction A of the outer frame element 1. The perforations of one row, exemplified by perforation 151, being staggered with respect to the perforations of the adjacent row, exemplified by perforation 152.

[0089] In this embodiment the perforations 15 are elongate and having rounded shapes, but it will be understood that other shapes are also possible. Likewise, the perforations need not be evenly distributed over the entire outer frame element, but may, for example, be left in the bottom part or in one or both of the first and second side flanges. Moreover, the outer frame element may include perforations of different sizes and/or shapes.

[0090] Figure 1b shows an embodiment of a fire-shielding U-shaped outer frame element 1 as described with reference to figure 1a where the outer frame element 1 comprises two first elongate strips 16a, 16b.

[0091] The first strips 16a, 16b are arranged on the exterior surfaces 132, 142 of the first side flange 13 and the second side flange 14, respectively. The first strips 16a, 16b shield the wall element from heat from a fire.

[0092] In figure 1b an end of the outer frame element is shown without the strips, but it will be understood that the first strips 16a, 16b may extend over substantially an entirety of the exterior surfaces 132, 142 of the side flanges 13, 14.

[0093] Figure 1c shows an embodiment of the fire-shielding U-shaped outer frame element 1 as described with reference to figure 1a where the outer frame element 1 comprises a second elongate strip 17.

[0094] The bottom part 12 comprising an interior surface 121 and an exterior surface 122, the second strip 17 being arranged on the interior surface 121 of the bottom part 12 to shield the wall element (not shown) from heat from a fire.

[0095] Here the second strip 17 is arranged with a small distance to the side flanges 13, 14, but it may also be arranged so that it abuts the interior surfaces 131, 141 of the side flanges.

[0096] As described with reference to the first strips 16a, 16b, the second strip 17 may extend over substantially the entire length of the bottom part 12.

[0097] First and the second strips may be arranged at varying positions on the outer frame element, also in combination with each other. For example, the second strip 17 may be arranged on the exterior surface of the bottom part 12, possibly formed in one with the first strips 16a, 16b, or the first strips may be arranged on the interior sides of the side flanges 13, 14.

[0098] Here the first and second strips 16a, 16b, 17 are attached to the outer frame element 1 by means of a high-temperature resistant adhesive (not shown), but the strips may also be attached to the outer frame ele-

ment 1 by mechanical means such as screws, nails, rivets, studs, staples or the like.

[0099] The first and second strips 16a, 16b, 17 preferably comprise material having thermal shielding properties, such as magnesium silicate, and/or intumescent properties, such as ammonium phosphate.

[0100] In another embodiment, the outer frame element 1 may be assembled from a base element 20 and an adaptor element 14b as shown in Figs 9 and 10.

[0101] Figure 7 shows a perspective view of a base element 20 and Figure 8 shows a perspective view of two consecutive connected adaptor elements 13b. Both Figure 7, Figure 8 and Figure 9 show an unassembled condition.

[0102] The base element 20 may also be provided as two or more consecutive connected base elements 20, and/or the adaptor element 13b may be provided as a single element of the same length as the two shown in Fig. 8. Both base elements and adaptor elements 13b may be provided as a plurality of consecutive connected to form a longer outer frame element.

[0103] In this embodiment the outer frame element 1 is composed of at least two separate components including a base element 20 and an adaptor element 14b, where the adaptor element 14b forms a first part 14b of the second side flange 14. The U-shaped outer frame element 1 here comprises an attachment element 19 for fixating the base element 20 and the adaptor element 14b to each other.

[0104] With reference to Figure 7, the base element 20 comprises the bottom part 12, the first side flange 13 and a second part 14a of the second side flange 14. The first side flange and bottom part are embodied in substantially the same way as described with reference to Fig. 1.

[0105] Two projecting flanges 19 serving as attachment elements are provided on the base element. Each attachment element 19 is attached at one end 19a to the second part 14a of the second side flange 14. In this embodiment each attachment element 19 extends from said second part 14a at an angle of approximately 90 degrees with respect to said second part 14a and is of a substantially rectangular configuration, but it should be understood that other angles and shapes may be used. For example the attachment elements may be arranged to project slightly upwards in Figs 9 and 10 to ease attachment of the adaptor element and/or the part of the attachment elements may be provided with rounded corners to ease assembly.

[0106] During installation where the base element 20 is mounted first without the adaptor element, the wall element (not shown) can easily be inserted to abut the inner side of the first side flange, the attachment elements 19 may act as guides for sliding the wall element into the correct position.

[0107] Each attachment element 19 has an elongate shape and a height in the height direction h that is smaller or approximately equal to a perforation in the adaptor

element (shown on Figure 8), said perforation being adapted for receiving the attachment element 19.

[0108] The perforation adapted for receiving the attachment element 19 may be part of the plurality of perforations 15 arranged in a plurality of rows extending in the longitudinal direction A of the adaptor element 14b as described with reference to other embodiments above. The perforations of one row, exemplified by perforation 151, are staggered with respect to the perforations of the adjacent row, exemplified by perforation 152

[0109] The second part 14a of the second side flange is shorter than the first side flange 13 in the height direction h.

[0110] A distance between the first side flange 13 and the second part 14a of the second side flange in the width direction is smaller than the width of the wall element (not shown), which the U-shaped outer frame element is intended to receive.

[0111] On Figure 8 the adaptor element 14b comprises at least one perforation adapted for receiving the attachment element 19 (as seen on Figure 19).

[0112] The adaptor element 14b comprises a first section 501 and a second section 502. The first 501 and second 502 sections are off-set in relation to each other in the width direction w.

[0113] To assemble the outer frame element 1, the attachment element 19 is guided through a perforation of the adaptor element 14b, so that the first part 501 of the adaptor element 14b abuts and extends along the second part 14a. The second part 14a and the first part 14b constituting the second flange 14 in the assembled condition. To enable this, the flanges 19 serving as attachment element and the perforation in at least the adaptor element are arranged to be opposite each other when the base element and the adaptor element are positioned correctly in relation to each other. When the attachment elements are made with a cross-sectional shape corresponding to the shape of the perforations in the adaptor element, this will also contribute to preventing erroneous assembly of the outer frame element.

[0114] The attachment element 19 is thereafter bend, so that in the assembled and mounted condition as seen on Figure 10, the attachment element 19 extends along the first section 501 of the adaptor element 14b.

[0115] In Figure 10 the first section 501 of the flange 19 serving as attachment element extends along the second part 14a of the second side flange and said second section 502 extends along a second exterior surface 62 of the wall element 6.

[0116] For aesthetic reasons the exterior surfaces of the wall elements may comprise films, tapes or the like being part of said exterior surfaces. Further tape (not shown) may also be provided on the interior side of first and second side flanges to protect the wall element from adhesive from other adjacent components used, for example for the attachment of fire-shielding strips on the exterior sides of the first and second flanges. This is especially relevant when the wall element is made of glass,

which might break under the influence of thermal expansion if adhering to the outer frame elements,

[0117] The off-set between the first 501 and second 502 sections ensures that a width between the first side flange 13 and the first section 501 is smaller than a width between the first side flange 13 and the second section 502.

[0118] Thus the larger width of from the first side flange 13 to the second sections ensures room for the bended attachment element 19, so that the width between the exterior sides of the first side flange 13 and of the bended attachment element 19 will approximately correspond to the width between the exterior sides of the first side flange 13 and of the second section 503 in the width direction w.

[0119] Here the adaptor element 14b and the base element 20 have substantially the same length in the longitudinal direction A as the wall element 6, but this need not be the case.

[0120] The second side flange 13 has substantially the same height as the first side flange 14.

[0121] As seen on Figure 9, the wall element 9 is positioned on a spacer element 600, the spacer element being positioned on the bottom part 12 of the base element 20. Optionally a second elongated strip 17 can be positioned between the bottom part 12 and the spacer element 600.

[0122] The spacer element 600 raises the wall element 6 with respect to the bottom part 12. Here the height of the spacer element in the height direction h is larger than the height of the second part 14a, so that in the mounted condition with the spacer element 600 the second part 14a is not in direct contact with the wall element.

[0123] Preferably each wall element is positioned on two spacer elements.

[0124] During a fire the second elongated strip 17 may expand in the space between the bottom part 12, wall element 6 and first and second side flanges 13, 14. The spacer may be elastic to provide a resilient support or/and made from a material that will yield or melt in the event of fire.

[0125] A space between the wall element and an outer frame element is also shown in Fig. 11, which illustrates the upper edge of the wall element in the mounted condition. A wall construction of the invention may be made with an upper side as illustrated in Fig. 11 and a lower side as illustrated in Fig. 10.

[0126] The first and second flanges of the outer frame element shown in Figs 7-10 will be provided with fire-shielding strips 16a, 16b as shown in Fig. 11. The strip on the first side flange may be provided either before or after installation, but the one on the second side flange will have to be attached after the flanges 19 have been bent. The fire-shielding strip may possibly be attached to the second section of the adaptor element in the state of delivering and then attached to the first section and the flanges after assembly. The outer frame elements in Figs 9-11 are provided with screws penetrating through perforations in the bottom part. These screws are intend-

ed for use in attached the outer frame element to an adjacent structure such as a ceiling, floor, wall, load bearing construction.

[0127] Figure 3a shows a top view of a fastening element 4 in an inactive condition. The fastening element comprises an elongate base part 41 having a first end 411 and a second end 412 and two opposite sides 413, 414 extending in the longitudinal direction B.

[0128] The fastening element 4 further comprises a holding part 42 comprising a head part 421 and two arms 422, 423 extending in the same plane as the base part 41. The head part 421 is connected to the first end 411 of the base part 41. The one arm 422 extends along one side 413. The other arm 423 extends along the other side 414.

[0129] The fastening element 4 further comprises an elongate fixation part 43 connected to the second end 412 of the base part 41. The fixation part 43 comprises an elongate slot defining a first fixation arm 431 and a second fixation arm 432, said fixations arms extending in the same plane and in the longitudinal direction B. Here the length of the first 431 and second 432 fixations arms are the same, but the length may be different from each other.

[0130] In this embodiment the base part 41, the U-shaped holding part 42 and the fixation part 43 extends in the same plane in order to be obtainable by a process of punching one single work-piece 4 out from a single sheet of plate metal. The work-piece 4 is subsequently folded or bent into the active mounted condition of the fastening element 4 shown in figure 3b. The folding lines a and b are perpendicular to the longitudinal direction B as shown with dashed lines. All foldings are by approximately 90°. The folding line b defines the transition between the base part and the fixation part. The elongate slot of the fixation part may extend to into the base part or extend all the way from the fixation part to the holding part.

[0131] The distance between the folding line a and folding line b corresponds approximately to the wall thickness of the wall elements. The fold lines a and/or b may be indicated by means, such as colouring or mechanical marking, to indicate when the fastening element has pushed far enough through the gap between the wall elements. A weakening of the material at the folding line b may be applied to make the bending easier, said weakening potentially also serving as a bending indication.

[0132] Figures 3b and 3c show fastening elements 4, 8 in an active condition. The holding parts 42, 82 and the base parts 41, 81 extend in respective planes forming a mutual angle of approximately 90°. The first fixation arms 431, 831, 432, 832 and the base part 41, 81 extend in respective planes forming mutual angles of approximately 90°. The first 431, 831 and second 432, 832 fixations arms extend in opposite directions in the same plane. The holding part 42, 82 and the first 431, 831 and second 432, 832 fixations arms extend in parallel planes.

[0133] Figure 2 shows a top view of a cover profile 2

comprising an interior surface 23 (not visible) and an exterior surface 22 and at least one longitudinal elongate slot 21, which is wider than the fixation part and base part of the fastening element. The cover profile 2 is adapted for extending along a first exterior surface of each of the first and second wall elements in a mounted condition.

[0134] Figure 4 shows a horizontal sectional view of a fire-shielding fastening means 200 in an active mounted condition. The fastening means 200 comprises a first 2 and a second 3 cover profile as described with reference to Fig. 2 and a fastening element 4 as described with reference to Figs 3a-3c. The fastening means 200 is arranged between a first 6 and a second 7 wall element, so as to hold the first 6 and second 7 elements together.

[0135] The first cover profile 2 extends along a first exterior surface 61, 71 of each of the first 6 and second 7 wall elements. The second cover profile 3 extends along a second exterior surface 62, 72 opposite the first exterior surface 61, 71 of each of the first 6 and second 7 wall elements.

[0136] A first fire-shielding material 10 is positioned between the first and second cover profiles 2, 3 and the wall elements 6, 7. The fire-shielding material 10 is abutting the interior surfaces 23, 33 of the cover profiles 2, 3 and the exterior surfaces 61, 71, 62, 72 of the first 6 and second 7 wall elements.

[0137] The base part 41 of the fastening element is positioned between the first 6 and second 7 wall elements. The first end 411 extends through a slot 21 in the first cover profile 2 and the second end 412 extends through a corresponding slot 31 in the second cover profile 3. The holding part 42 is bent approximately 90° with regards to the base part 41 and abuts an exterior surface 22 of the first cover profile 2.

[0138] The first 431 and second 432 fixation arms are bent approximately 90° with regards to the base part 41. The fixation arms 431, 432 extend in opposite directions away from the base part 41 and abut an exterior surface 32 of the second cover profile 3.

[0139] A second fire-shielding material 11 is positioned between the wall elements 6, 7 and the base part 41.

[0140] The purpose of both the first fire-shielding material 10 and the second fire-shielding material 11 is to prevent fire from spreading via the gap between the wall elements 6, 7 and to protect the edges of the wall elements in the same way as the fire-shielding strips attached to the outer frame element(s) as described above. The first and second fire-shielding material 10, 11 can be made from the same material(s) as the fire-shielding strips 16a, 16b, 17 on the outer frame element(s).

[0141] First and second fire-shielding materials may be provided in varying combinations between and/or on the wall elements and cover profiles.

[0142] Figure 5 shows a perspective sketch of a wall construction made with a set of parts 100 in an active mounted condition. The set of parts 100 comprises a first fire-shielding U-shaped outer frame element 1 and a second outer frame element 5 supporting a side of the sec-

ond wall element 7, and a fire-shielding fastening means 200 arranged between the first 6 and second 7 wall elements, so as to hold the first 6 and second 7 elements together.

[0143] An interior surface 131 of the first side flange 13 of the first outer frame element 1 abuts a first exterior surface 71 of the second wall element 7, and an interior surface 141 of the second side flange 14 abuts a second exterior surface 72 opposite the first exterior surface 71 of the second wall element 7. The same applies to the second outer frame element 5.

[0144] Cover profiles 2, 3 extend along the exterior surfaces 61, 71, 62, 72 of the first 6 and second 7 wall elements in the same way as described with reference to Fig. 4.

[0145] First 4 and second 8 fastening elements are mounted between the first 6 and second 7 wall elements and interconnecting covering profiles 2, 3, 9 in the way described with reference to Fig. 4. Holding parts 42 of first fastening elements 4 abut a first cover profile 2 and fixation parts (not shown) of the first fastening elements 4 abut a second cover profile 3. Holding parts (not shown) of second fastening elements 8 abut the second cover profile 3 and fixation parts 83 of the second fastening elements 8 abut a third cover profile 9 arranged in continuation of the first cover profile 2 along the first exterior surfaces 61, 71 of the wall elements 6, 7.

[0146] Here the first cover profile 2 and the third cover profile 9 are mounted at a distance from each, said distance being approximately 5 mm, in order to allow thermal expansion of the cover profiles but alternatively they might overlap. The first 1 and second 5 outer frame elements are arranged with a similar distance for the same purpose.

[0147] The staggered position of the cover profiles contributes to a wall construction which is both very stable and with excellent fire-shielding properties due to the absence of parallel horizontal joints between the cover profiles on the two sides of the wall.

[0148] The fastening elements 4, 8 may be positioned in any desired direction, so that the holding parts 42, 82 and fixation parts 43, 83 abut either of the at least three cover profiles 2, 3, 9, but arranging the holding parts on opposite sides of the wall contributes to a symmetrical and hence stable wall construction.

[0149] Figure 6 shows a perspective view of a wall construction 300 mounted by means of U-shaped outer frame elements 1.

[0150] Finishing elements 18 are mounted on the exterior sides of the outer frame elements 1 to give a pleasing aesthetic look. The finishing elements may be of any design and any materials, such as aluminium or polymers. The finishing elements may be mounted with any non-fire-resistant fastening means, so that they will fall off during a fire. Similar finishing elements may be provided on the cover profiles described with reference to Figs 4 and 5.

[0151] The wall elements 6, 7 shown in Figs 4-6 are

made from fire-rated glass, but the invention also applies to wall constructions with other types of wall elements.

[0152] As seen on Figure 11, elongated strips 16a, 16b are positioned on the exterior surfaces of the outer frame element 1 and a second elongated strip 17 is positioned on the inside surface of the bottom part.

[0153] Although some embodiments have been described and shown in detail herein, the invention is not restricted to them, but may also be embodied in other ways within the scope of the subject matter defined in the following claims. In particular, it is to be understood that other embodiments may be utilised and structural and functional modifications may be made without departing from the scope of the present invention.

[0154] In device claims enumerating several means, several of these means can be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims or described in different embodiments does not indicate that a combination of these measures cannot be used to advantage.

[0155] It should be emphasized that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Enumerated items

[0156]

1. A fire-shielding U-shaped outer frame element (1) adapted for supporting a side of at least one wall element in a wall construction, said outer frame element (1) being elongate in a longitudinal direction and comprising a bottom part (12) and a first side flange (13) and a second side flange (14), the first and second side flanges extending away from the bottom part (12) in a height direction (h), an interior surface (131) of the first side flange (13) being adapted for extending along a first exterior surface of the wall element and an interior surface (141) of the second side flange (14) being adapted for extending along a second exterior surface opposite the first exterior surface of the wall element in a mounted condition of the outer frame element (1) so as to hold the wall element to form said wall construction, wherein the outer frame element (1) comprises a first elongate strip (16) and a plurality of perforations (15) in the bottom part, the first side flange and/or the second side flange, said first strip (16) comprising a material having thermal shielding properties and being arranged on an interior (131, 141) and/or exterior (132, 142) surface of the first side flange (13) and/or second side flange (14) of the outer frame element (1).

2. A U-shaped outer frame element (1) according to

item 1, wherein said outer frame element (1) is composed of at least two separate components including a base element (20) and an adaptor element (14b) forming at least a first part of the second side flange (14).

3. A U-shaped outer frame element (1) according to item 2, further comprising an attachment element (19) for fixing the base element (20) and the adaptor element (14b) to each other.

4. A U-shaped outer frame element (1) according to any one of items 2 to 3, wherein the attachment element (19) is provided on the base element (20).

5. A U-shaped outer frame element (1) according to any one of items 3 to 4, wherein the adaptor element (14b) comprises at least one perforation adapted for receiving the attachment element (19).

6. A U-shaped outer frame element according to any one of items 2 to 5, wherein the base element (20) comprises the bottom part (12), the first side flange (14) and a second part (14a) of the second side flange.

7. A U-shaped outer frame element (1) according to item 6, wherein the second part (14a) of the second side flange formed by the base element (20) is shorter than the first side flange (13) in the height direction (h).

8. A U-shaped outer frame element (1) according to any one of items 6 to 7, wherein the distance between the first side flange (13) and the second part (14a) of the second side flange in a width direction is smaller than the width of the wall element, which the U-shaped outer frame element (1) is intended to receive.

9. A U-shaped outer frame element (1) according to any one of items 6 to 8, wherein the adaptor element (14b) comprises a first section (501) and a second section (502), said first section (501) being adapted for extending along the second part (14a) of the second side flange and said second section (502) being adapted for extending along the second exterior surface of the wall element, and wherein the first and second sections (501, 502) are off-set in relation to each other in a width direction (w), so that a width between the first side flange (13) and the first section (501) is smaller than a width between the first side flange (13) and the second section (502) in an assembled condition of the outer frame element (1).

10. A U-shaped outer frame element (1) according to any one of items 2 to 9, wherein the adaptor element (14b) has substantially the same length in the longitudinal direction as the base element (20).

11. A U-shaped outer frame element (1) according to any one of items 2 to 10, wherein in the assembled condition of the outer frame element, the second side flange (14) has substantially the same height as the first side flange (13).

12. A U-shaped outer frame element (1) according to any one of the preceding items, wherein the plu-

ality of perforations (15) are arranged in at least two rows extending in a longitudinal direction (A) of the outer frame element (1).

13. A U-shaped outer frame element (1) according to any one of the preceding items, wherein the perforations (151) of one row are staggered with respect to adjacent perforations (152) of another row.

14. A U-shaped outer frame element (1) according to any one of the preceding items, further comprising a second elongate strip (17) comprising a material having thermal shielding properties, the second strip (17) being arranged on an interior (121) and/or exterior (122) surface of the bottom part (12) of the outer frame element (1).

15. A U-shaped outer frame element (1) according to any one of the preceding items, wherein the first (16) and/or second (17) elongate strip(s) comprise(s) material having thermal shielding properties, such as magnesium silicate, and/or intumescent properties, such as ammonium phosphate.

16. A set of parts (100) having fire-shielding properties for assembly of a first and a second wall element into a wall construction, the set of parts (100) comprising:

a fire-shielding U-shaped outer frame element (1) according to any one of items 1 to 15, the outer frame element (1) being adapted for supporting a side of the first and/or second wall element when in an active mounted condition, and a fastening means (200) adapted for being arranged between the first and second wall elements, so as to hold the first and second elements together.

17. A set of parts (100) according to item 16, wherein the fire-shielding fastening means (200) comprises a fastening element (4) comprising:

- an elongate base part (41),
- a holding part (42) connected to a first end (411) of the base part (41),
- a fixation part (43) connected to a second end (412) of the base part (41), the fixation part (43) comprising a first fixation arm (431) and a second fixation arm (432),
where the base part (41) and the fixation part (43) extend in the same plane when in an inactive condition,
wherein the fastening element (4) is adapted for being arranged in said active mounted condition with
- the base part (41) positioned between the first and second wall elements,
- the holding part (42) extending at an angle to the base part (41) and extending along first exterior surfaces (61, 71) of the first (6) and/or second (7) wall elements,

- the first (431) and second (432) fixation arms extending at an angle to the base part (41) and extending along a second exterior surface (62, 72) of the first (6) and/or second (7) wall element, so as to hold the first (6) and second (7) wall elements together.

18. A set of parts (100) according to item 17, wherein the fire-shielding fastening means (200) further comprises:

a first (2) and a second (3) cover profile each comprising at least one longitudinal elongate slot (21, 31), the first cover profile (2) being adapted for extending along the first exterior surfaces (61, 71) of each of the first (6) and second (7) wall elements at the joint between them in a mounted condition, the second cover profile (3) being adapted for extending along the second exterior surfaces (62, 72) opposite the first exterior surface of each of the first (6) and second (7) wall elements at the joint between them in a mounted condition, where
the first end (411) of the base part is adapted for extending through the at least one slot (21) of the first cover profile (2) and the second end (412) of the base part is adapted for extending through the at least one slot (31) of the second cover profile (3), so that in the mounted condition the holding part (42) is extending at an angle to the base part (41) and extending along an exterior surface (22) of the first cover profile (2), and the first (431) and second (432) fixations arms are extending at an angle to the base part (41) and extending along an exterior surface (32) of the second cover profile (3),
so as to hold the first (2) and second (3) cover profiles and first and second wall elements together.

19. A set of parts (100) according to any one of items 16 to 18, comprising at least two U-shaped outer frame elements (1, 5), the outer frame elements (1, 5) being adapted for being arranged in the active mounted condition at a distance from each other at a side of the first and/or second wall element, said distance being 1 to 10 mm, preferably 3 to 7 mm, more preferred approximately 5 mm.

20. A set of parts (100) according to any one of items 17 to 19, wherein in the active mounted condition the first (431) and second (432) fixations arms extend in opposite directions in the same plane.

21. A set of parts (100) according to any one of items 17 to 20, wherein in the inactive condition the holding part (42) is U-shaped comprising a head part (421) and two arms (422, 423), the head part (421) being connected to the first end (411) of the base part (41) and the two arms (422, 423) extending along oppo-

site sides (413, 414) of the base part (41) in a longitudinal direction (B) of the base part (41).

22. A set of parts (100) according to any one of items 17 to 21, wherein the fastening element (4) in its inactive condition is a single work-piece punched out from a single sheet of plate metal and adapted for being brought into the active mounted condition by folding and/or bending.

23. A set of parts (100) according to any one of items 16 to 22, wherein the outer frame element (1) is composed of at least three separate components including a base element (20), an adaptor element (14b) and an attachment element (19) for fixating the base element (20) and adaptor element (14b) to each other, wherein said attachment element (19) is embodied as the fastening element (4) described in any of items 17 to 22 and wherein said base element (20) and said adaptor element (14b) are each provided with at least one perforation adapted for receiving the attachment element (19).

24. A wall construction (300) having fire-shielding properties and comprising a set of parts (100) according to any one of the items 16 to 23, the wall construction (300) further comprising:

at least two wall elements (6, 7) assembled by means of the set of parts (100), said wall elements (6, 7) being held in place by the set of parts (100) and the U-shaped outer frame element (1).

25. A wall construction (300) according to item 24, comprising at least two fastening elements (4, 8) mounted such that a holding part (42) of a first fastening element (4) is located on one side of the wall elements (6, 7) and a holding part (82) of the second fastening element (8) is located on the opposite side of the wall elements (6, 7).

26. A wall construction (300) according to item 24 or 25, comprising at least a first (2), a second (3) and a third (9) cover profile, the first (2) and third (9) cover profiles extending along the first exterior surfaces (61, 71) of the wall elements (6, 7), and the second cover profile (3) extending along the second exterior surfaces (62, 72) of the wall elements (6, 7) opposite the first exterior surfaces (61, 71), the at least three cover profiles (2, 3, 9) being arranged such that a first fastening element (4) connects to the first (2) and second (3) cover profiles and a second fastening element (8) connects to the second (3) and third (9) cover profiles.

27. A wall construction (300) according to any one of items 24 to 26, wherein the outer frame element (1) is composed of at least two separate components including a base element (20) and an adaptor element (14b), where the adaptor element (14b) forms at least a first part (14b) of the second side flange (14) and the base element (20) comprises a second part (14a) of the second side flange (14), and wherein the distance between the first side flange (13) and the second part (14a) of the second side flange (14)

in a width direction (w) is smaller than the width of the wall element (6, 7).

28. A wall construction (300) according to any one of items 24 to 27, wherein the wall elements (6, 7) is made substantially from glass, preferably fire-rated glass.

29. A method for mounting a wall construction (300) having fire-shielding properties comprising the steps of:

providing a set of parts (100) according to any one of items 16 to 23 for assembly of a first (6) and a second (7) wall element into a wall construction (300)

arranging the U-shaped outer frame element (1) on a side of the first (6) and/or second (7) wall element,

positioning the fastening element (4) being in its inactive condition with the base part (42) between the first (6) and second (7) wall elements, arranging the holding part (41) such that it extends along a first exterior surface (61, 71) of each of the first (6) and second (7) wall elements, and

bending the first (431) and second (432) fixations arms, so that the first (431) and second (432) fixations arms extend along a second exterior surface (62, 72) opposite the first exterior surface (61, 71) of each of the first (6) and second (7) wall elements, so as to hold the wall elements (6, 7) together.

30. A method for mounting a wall construction (300) according to item 29, the method further comprising the steps of:

arranging a first cover profile (2) such that it extends along the first exterior surface (61, 71) of each of the first (6) and second (7) wall elements, arranging the second (3) cover profile such that it extends along the second exterior surface (62, 72) of each of the first (6) and second (7) wall elements,

positioning the fastening element (4) being in its inactive condition such that the first end (411) of the base part (41) extends through a slot (21) in the first cover profile (2) and the second end (412) extends through a slot (31) in the second cover profile (3) and the base part is positioned between the first (6) and second (7) wall elements,

arranging the holding part (41) such that it extends along an exterior surface (22) of the first cover profile (2), and

bending the first (431) and second (432) fixations arms, so that the first (431) and second (432) fixations arms extend along the exterior surface (32) of the second cover profile (3), so

as to hold the first (2) and second (3) cover profiles and the wall elements (6, 7) together.

Claims

1. A fire-shielding U-shaped outer frame element (1) adapted for supporting a side of at least one wall element in a wall construction, said outer frame element (1) being elongate in a longitudinal direction and comprising a bottom part (12) and a first side flange (13) and a second side flange (14), the first and second side flanges extending away from the bottom part (12) in a height direction, an interior surface (131) of the first side flange (13) being adapted for extending along a first exterior surface of the wall element and an interior surface (141) of the second side flange (14) being adapted for extending along a second exterior surface opposite the first exterior surface of the wall element in a mounted condition of the outer frame element (1) so as to hold the wall element to form said wall construction, wherein the outer frame element (1) comprises a first elongate strip (16) and a plurality of perforations (15) arranged in the bottom part, said first strip (16) comprising a material having thermal shielding properties and being arranged on an interior surface (131, 141) of the first side flange (13) and/or an exterior (132, 142) surface of the first side flange (13) and/or on the second side flange (14) of the outer frame element (1), wherein the plurality of perforations (15) are arranged in at least two rows extending in a longitudinal direction of the outer frame element (1), wherein the perforations of one row are staggered with respect to adjacent perforations of another row.
2. A U-shaped outer frame element according to claim 1 wherein said outer frame element (1) is composed of at least two separate components including a base element (20) and an adaptor element (14b) forming at least a first part of the second side flange
3. A U-shaped outer frame element according to claim 2, further comprising an attachment element (19) for fixating the base element (20) and the adaptor element (14b) to each other.
4. A U-shaped outer frame element (1) according to any one of claims 2 to 3, wherein the attachment element (19) is provided on the base element (20).
5. A U-shaped outer frame element (1) according to any one of claims 2 to 4, wherein the adaptor element (14b) comprises at least one perforation adapted for receiving the attachment element (19).
6. A U-shaped outer frame element according to any one of claims 2 to 5, wherein the base element (20) comprises the bottom part (12), the first side flange (13) and a second part (14a) of the second side flange.
7. A U-shaped outer frame element (1) according to claim 6, wherein the second part (14a) of the second side flange formed by the base element (20) is shorter than the first side flange (13) in the height direction (h).
8. A U-shaped outer frame element (1) according to any one of claims 6 to 7, wherein the distance between the first side flange (13) and the second part (14a) of the second side flange in a width direction is smaller than the width of the wall element, which the U-shaped outer frame element (1) is intended to receive.
9. A U-shaped outer frame element (1) according to any one of claims 5 to 8, wherein the adaptor element (14b) comprises a first section (501) and a second section (502), said first section (501) being adapted for extending along the second part (14a) of the second side flange and said second section (502) being adapted for extending along the second exterior surface of the wall element, and wherein the first and second sections (501, 502) are off-set in relation to each other in a width direction (w), so that a width between the first side flange (13) and the first section (501) is smaller than a width between the first side flange (13) and the second section (502) in an assembled condition of the outer frame element (1).
10. A U-shaped outer frame element (1) according to any one of claims 1 to 9, wherein the adaptor element (14b) has substantially the same length in the longitudinal direction as the base element (20).
11. A U-shaped outer frame element (1) according to any one of claims 1 to 10, wherein in the assembled condition of the outer frame element, the second side flange (14) has substantially the same height as the first side flange (13).
12. A U-shaped outer frame element (1) according to any one of the preceding claims, wherein the perforations (151) of one row are staggered with respect to adjacent perforations (152) of another row.
13. A U-shaped outer frame element (1) according to any one of the preceding claims, further comprising a second elongate strip (17) comprising a material having thermal shielding properties, the second strip (17) being arranged on an interior (121) and/or exterior (122) surface of the bottom part (12) of the outer frame element (1).
14. A U-shaped outer frame element (1) according to

any one of the preceding claims, wherein the first (16) and/or second (17) elongate strip(s) comprise(s) material having thermal shielding properties, such as magnesium silicate, and/or intumescent properties, such as ammonium phosphate.

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15. A set of parts (100) having fire-shielding properties for assembly of a first and a second wall element into a wall construction, the set of parts (100) comprising:

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a fire-shielding U-shaped outer frame element (1) according to any one of claims 1 to 14, the outer frame element (1) being adapted for supporting a side of the first and/or second wall element when in an active mounted condition, and a fastening means (200) adapted for being arranged between the first and second wall elements, so as to hold the first and second elements together.

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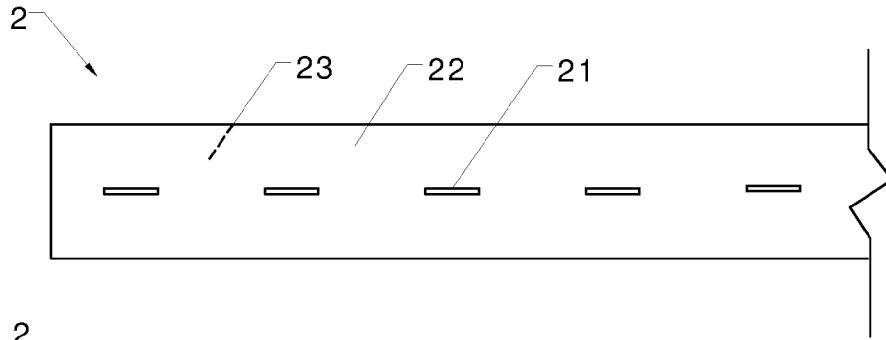


Fig. 2

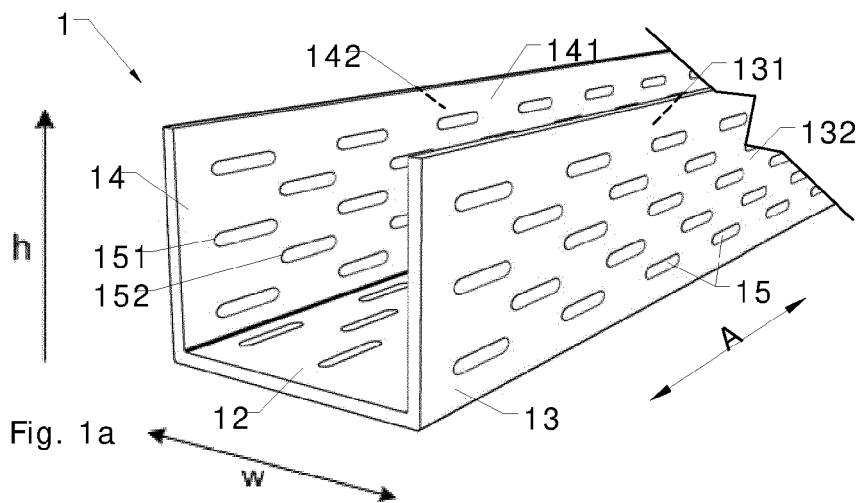


Fig. 1a

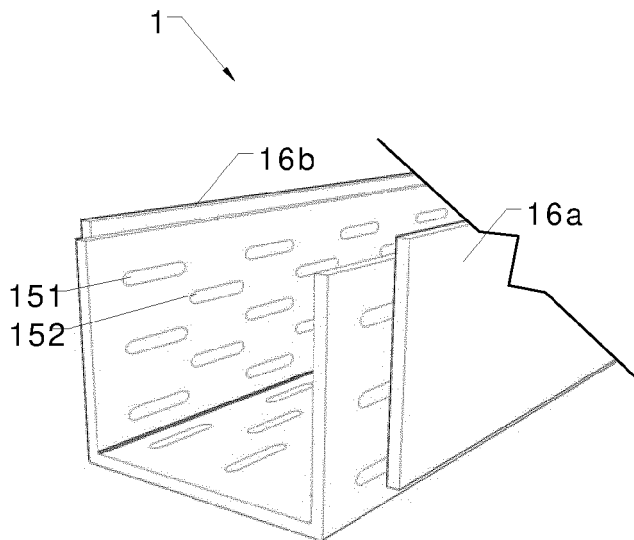


Fig. 1b

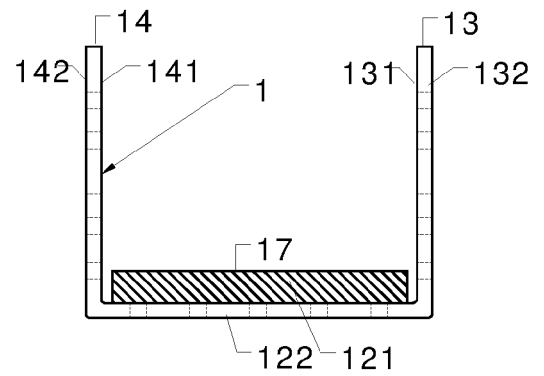


Fig. 1c

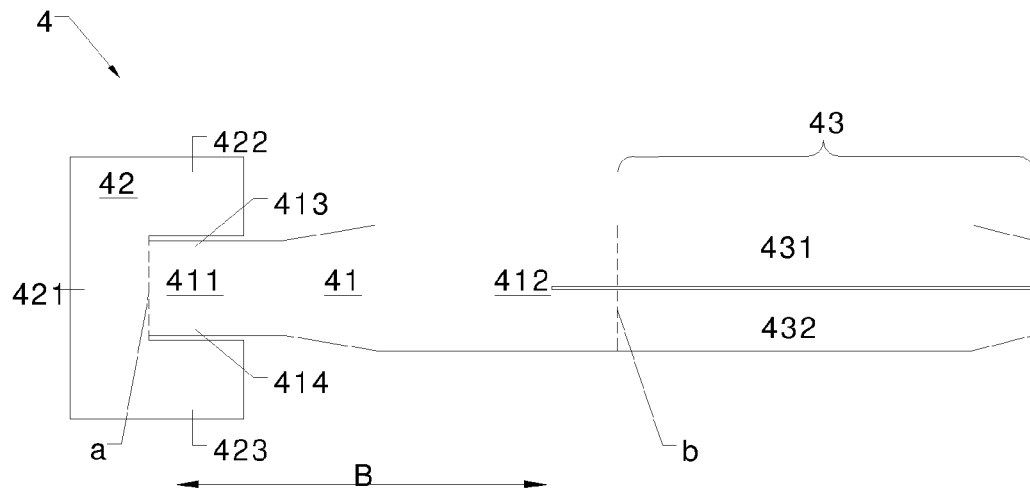


Fig. 3a

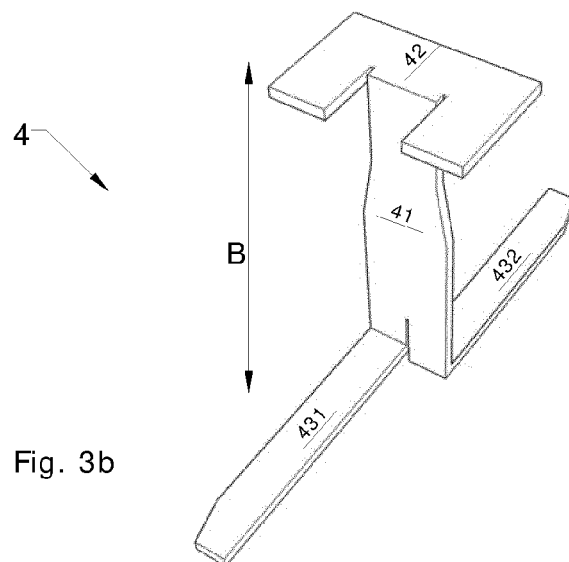


Fig. 3b

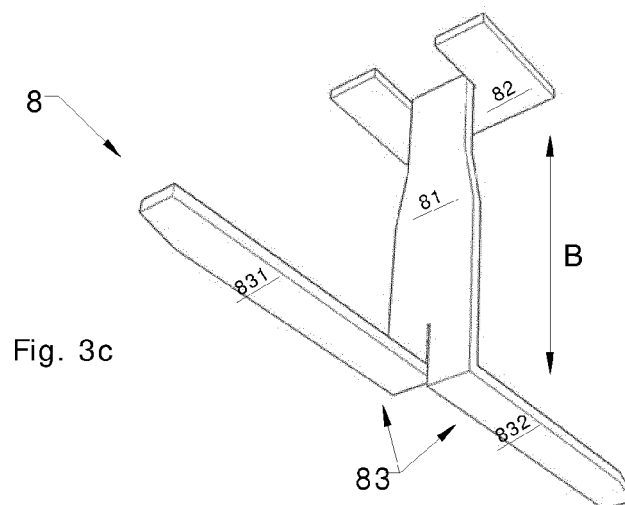


Fig. 3c

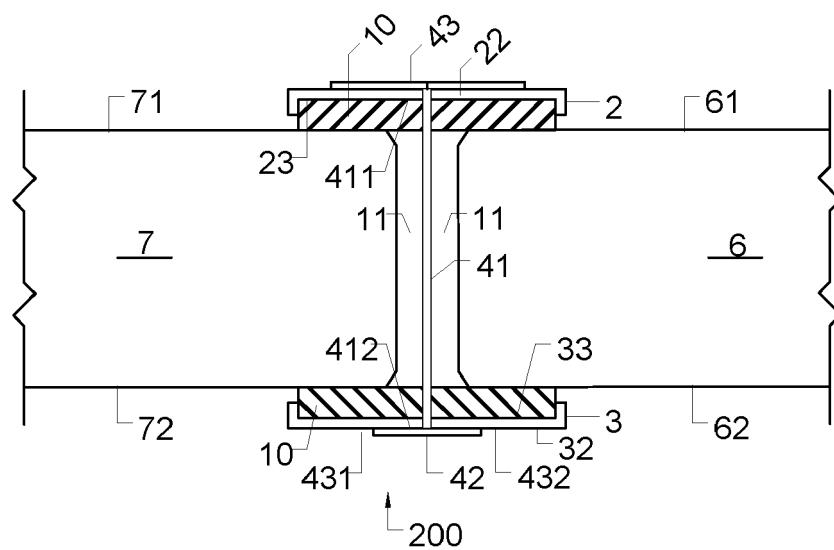


Fig. 4

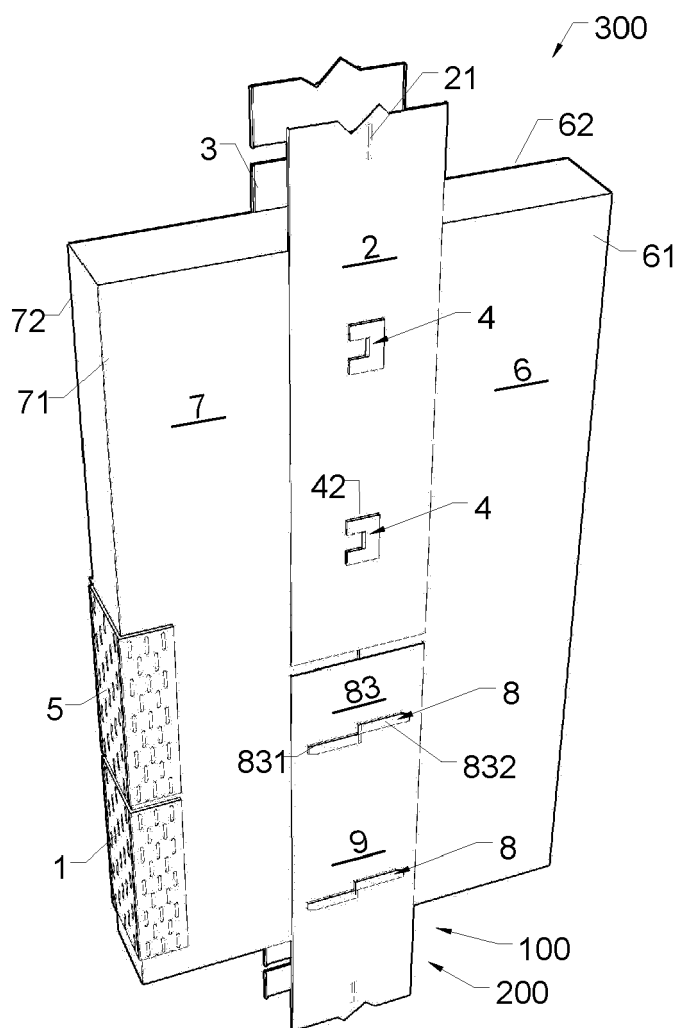


Fig. 5

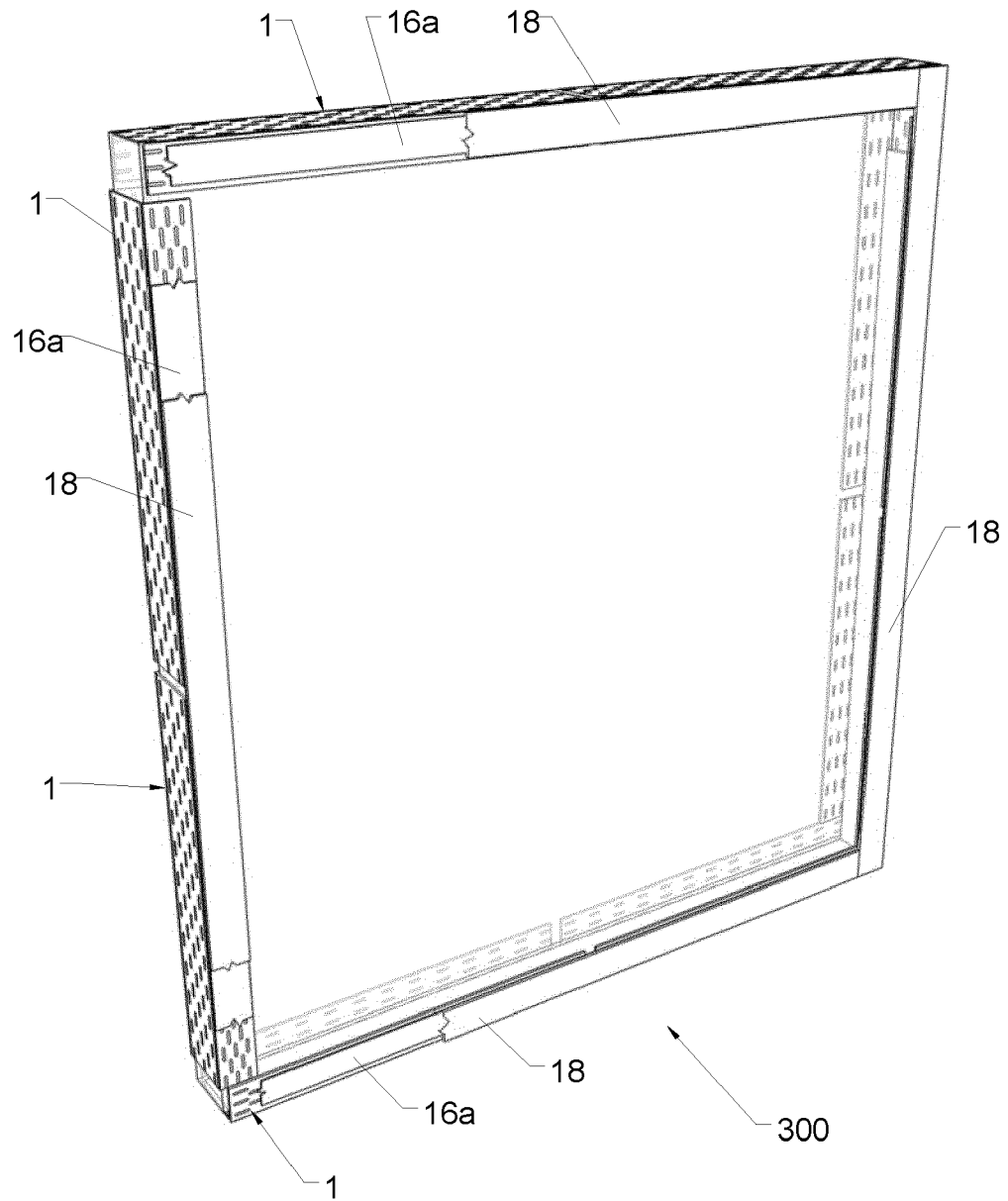


Fig. 6

Fig. 7

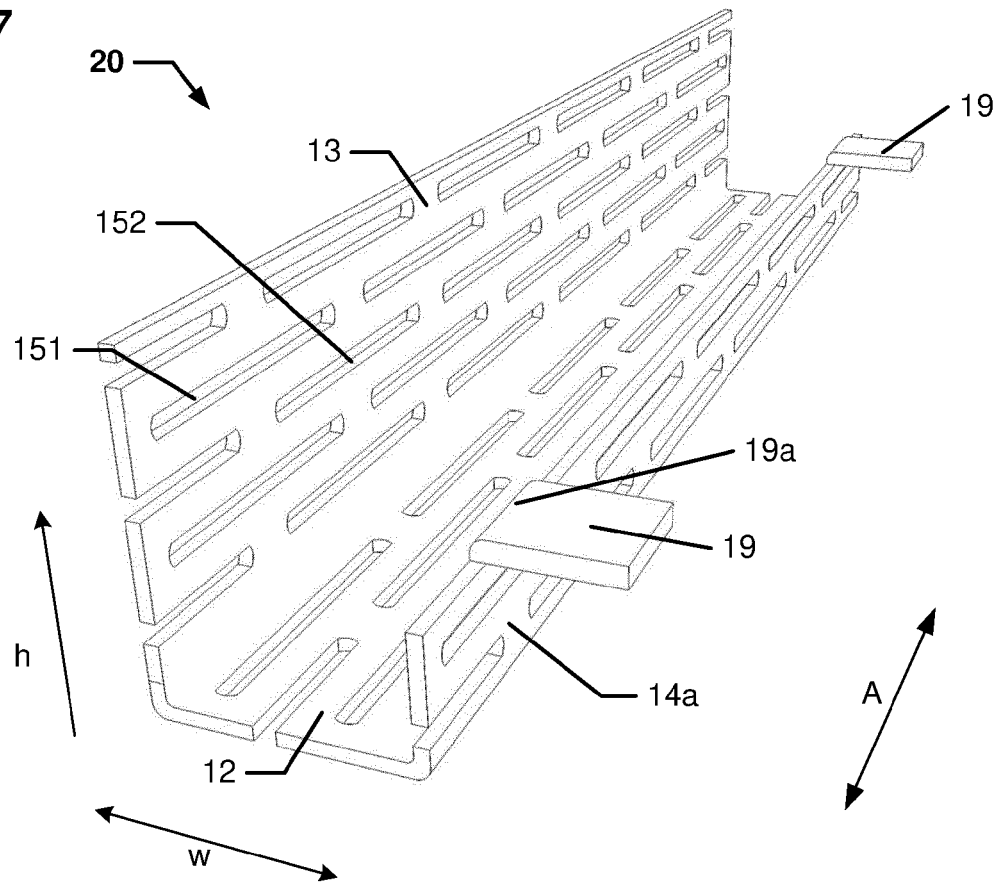


Fig. 8

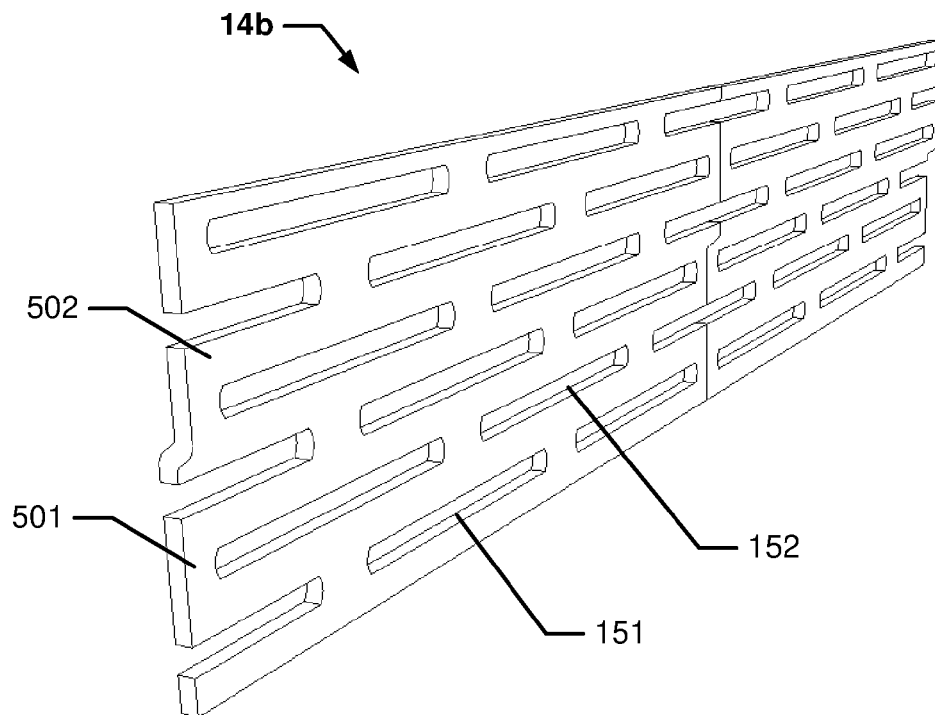


Fig. 9

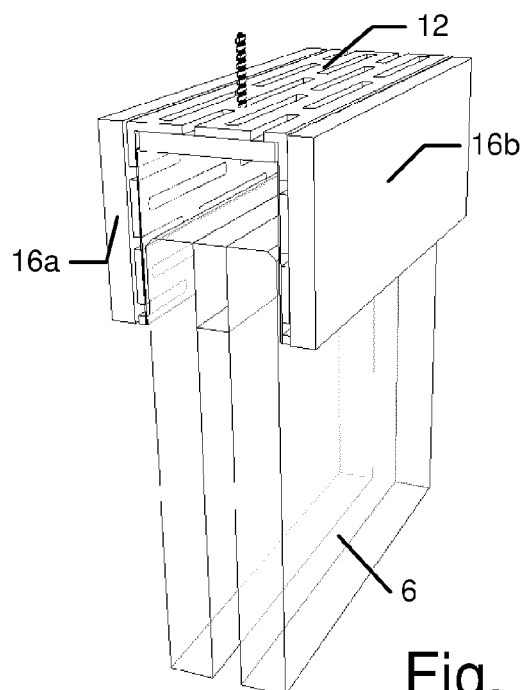
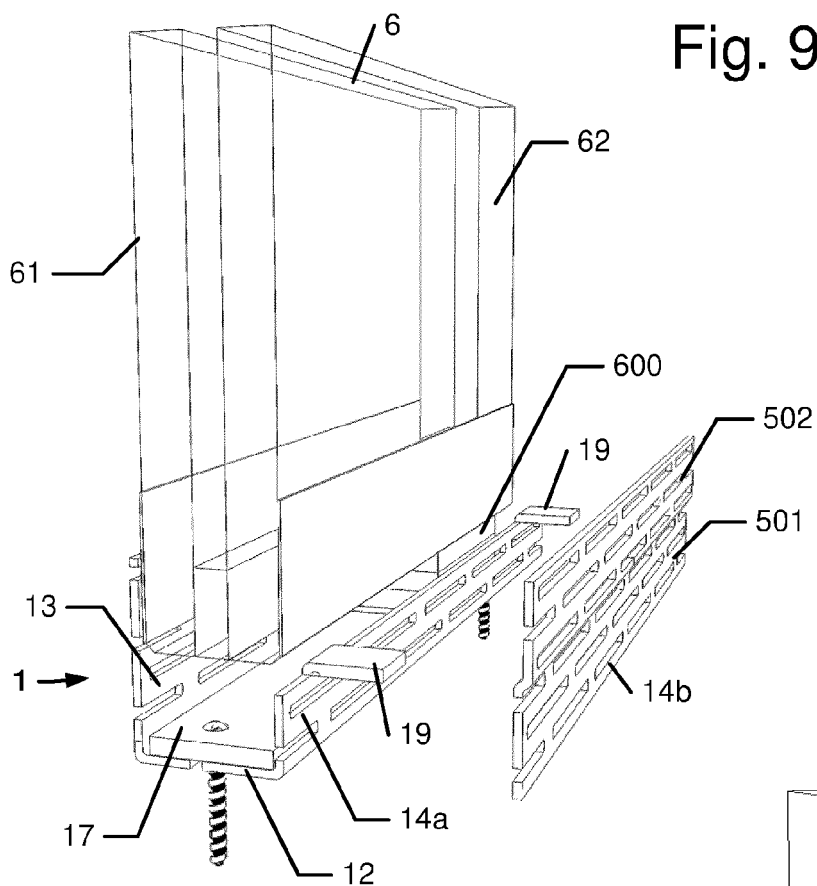


Fig. 11

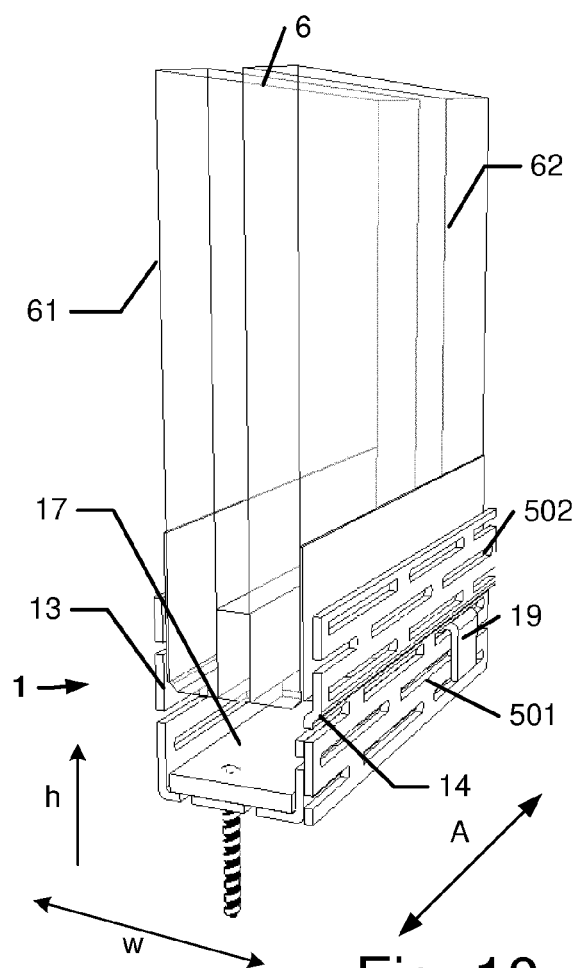


Fig. 10



EUROPEAN SEARCH REPORT

Application Number
EP 20 20 1556

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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	US 8 555 566 B2 (PILZ ET AL.) 15 October 2013 (2013-10-15)	1-6,9-15	INV. E04C3/09
A	* Combination of fig. 6, 7 and fig. 20; figures 6-8,20 *	7,8	E04C3/28 E04B1/94 E04B2/74
A	US 2011/099928 A1 (KLEIN JAMES A [US] ET AL) 5 May 2011 (2011-05-05) * figures 11C, 12, 14 *	1,12	ADD. E04C3/04
			TECHNICAL FIELDS SEARCHED (IPC)
			E04C E04B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 January 2021	Examiner Bauer, Josef
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		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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ON EUROPEAN PATENT APPLICATION NO.**

EP 20 20 1556

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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15-01-2021

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 8555566 B2	15-10-2013	US 2013219815 A1	29-08-2013
		US 2014130433 A1	15-05-2014
		US 2015247320 A1	03-09-2015
		US 2016265219 A1	15-09-2016
		US 2018030726 A1	01-02-2018
		US 2018347189 A1	06-12-2018

US 2011099928 A1	05-05-2011	NONE	

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

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Patent documents cited in the description

- US 8793947 B [0005]