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(54) **Method for renovating a facade and facade element for such a method**

(57) The invention relates to a facade (1) for a building having at least two floors (2) with concrete floor elements, which facade comprises;

- mounting beams (6) arranged parallel and in a mounting plane;

- mounting means (7) for mounting each mounting beam to an outer side surface of a concrete floor element of each floor;

- at least one facade element arranged between two parallel mounting beams, wherein the at least one facade element comprises a metal frame (19) having at least an upper frame part and a lower frame part attached to the adjacent parallel mounting beams.

The invention further relates to a method for renovating an old facade of a building having at least two floors, comprising concrete floor elements.

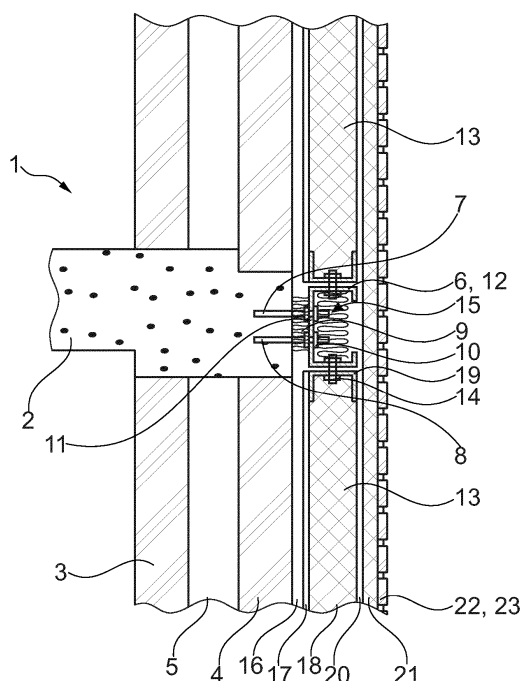


Fig. 1

Description

[0001] The invention relates to a facade for a building having at least two floors with concrete floor elements and to a method for renovating an old facade of a building having at least two floors, comprising concrete floor elements.

[0002] Buildings are often heated in order to provide comfortable conditions for the occupants of the building. The temperature outside of the building is often lower than the temperature required in the building, especially during winter. As a consequence, heat from the building may travel outside of the building via its facade. This requires further heating of the building in order to obtain the preferred temperature for the building and therefore increases heating costs. The additional heating also places a considerable burden on the environment.

[0003] It is therefore highly preferred to renovate old buildings by applying insulation material to a building in order to reduce the transport of heat via the facade of the building.

[0004] Currently available renovation methods however all have disadvantages. Applying insulation material to a building according to the currently available renovation methods requires partial or complete evacuation of the building. In some cases, even the complete building has to be stripped down to the supporting structure before renovation. When the insulation material is attached to the old facade, a new outside facade is often built, possibly out of separate bricks. Depending on the height and thereby weight of the new facade, such a new facade may require an additional or strengthened foundation to support the new facade. As a consequence, the currently available renovation methods are time consuming, the methods will put the occupant of the building in discomfort, and may require the occupant to temporarily move to another building.

[0005] It is now an object of the invention to reduce or even obviate the above-mentioned disadvantages.

[0006] This object is achieved with a facade for a building having at least two floors with concrete floor elements, which facade comprises;

- mounting beams arranged parallel and in a mounting plane;
- mounting means for mounting each mounting beam to an outer side surface of a concrete floor element of each floor;
- at least one facade element arranged between two parallel mounting beams, wherein the at least one facade element comprises a metal frame having at least an upper frame part and a lower frame part attachable to the adjacent parallel mounting beams.

[0007] A building with at last two floors with concrete floor elements will have concrete floor elements generally extending essentially horizontally with respect to the ground surrounding the building. With the facade accord-

ing to the invention, an air-tight outer wall comprising facade elements is attachable to the floor elements of the building through mounting beams. The mounting beams are preferentially placed extending essentially horizontally over at least a substantial part of the concrete floor elements or existing facade of the building using the mounting means. Such a new facade may not require a separate foundation, since the new facade obtains more supported from the concrete floor elements of the building. As a consequence, the renovation of a building is accelerated.

[0008] The mounting plane of the mounting beams is preferably essentially parallel to the old facade of the building, apart from any elements extending from the old facade of the building such as hanging balconies.

[0009] The floors of the building may also be other concrete supporting parts of the building which are not essentially floors, such as a roof beam. Or even, more generally, the facade may also be used for isolation of buildings with at least two floors with floor elements which are also suitable for supporting the facade according to the invention but which are not necessarily made of concrete.

[0010] When a mounting beam is mounted between the ground floor and a second floor of a building (or its equivalent, such as a roof), it may not be necessary to have the facade to comprise more than one mounting beam. The facade elements will in such a case only be supported by the mounting beam mountable between the ground floor and this second floor of the building.

[0011] It may also be possible to increase the facade elements in height, such that one facade element will span across multiple floors of the building. In such a case, it may as well not be necessary to have a mounting beam mountable to each floor element of the building.

[0012] The facade elements may be prefabricated at another location distant from the building. Because of this, the facade according to the invention allows easy and fast installation to the building. Thereby, the discomfort to the occupant of the building is further reduced.

[0013] In a preferred embodiment of the facade according to the invention, the mounting beams have a C-shaped cross-section, wherein the web of the beam is mounted by the mounting means and wherein the flanges of the beams are attached to an upper frame part or a lower frame part of the at least one facade element.

[0014] The C-shape of the beam preferably extends over the full length of the beam. The web of the beam is mountable to the concrete floor part. Extending from this mounting beam, preferably substantially parallel to the concrete floor parts or existing facade, the mounting beam is provided with an upper flange and a lower flange for the attachment of facade elements.

[0015] By providing the mounting beam with such a shape, the facade is easily mountable to the building. The facade allows for adjustment of the position of the beam relative to the building while the facade elements are attached to the mounting beam, as well as adjustment of the position of the facade elements relative to the

mounting beam.

[0016] In a preferred embodiment of the facade according to the invention, the mounting beams are enveloped by insulation material and a wall cladding panel is arranged to the mounting beams.

[0017] Preferably in the space enclosed by the flanges and the web of the mounting beam, the mounting beam must be provided with an insulation material. In such a way, the space between the building and the facade not covered by the facade elements is further insulated.

[0018] By providing the facade with a wall cladding panel on the outside of the facade, the mounting beam is hidden when the work is finished, and an ideal finish may be obtained. Such a cladding panel may further enhance the insulation effect of the facade as well.

[0019] In a preferred embodiment of the facade according to the invention, the facade further comprises a balcony floor, which balcony floor is mounted along one side to the mounting means.

[0020] By providing the facade with a balcony floor, the balcony floor may be mounted to the building after the application of the insulation material. In such a way, balconies may be added to the building. This may particularly be useful when balconies are removed from the building for the application of the facade as will become apparent in the methods according to the invention. This may however also be used to add (additional) balconies to a building.

[0021] The balcony floor may also be supported by a separate frame, for instance made of steel bars. This frame may also be embedded in the balcony floor. The frame may also be used to support a multitude of balcony floors arranged parallel to each other. Since the balcony floor in this case is supported by a frame, this increases the ease of attachment of the balcony floor to the building at the other end of the balcony floor by the mounting means, extending from the mounting plane.

[0022] In a preferred embodiment of the facade according to the invention, the mounting means comprise a threaded rod, a number of nuts and anchoring means arranged at one end of the threaded rod for anchoring in a concrete floor element or existing facade of a building.

[0023] By providing the facade with these mounting means, the threaded rod may be applied through the mounting beam in order to fix the mounting beam to the building. The position of the mounting beam relative to the building is adjustable by the nuts on the mounting means. The anchoring means may for instance be plugs, key bolts or chemical anchors. Such mounting means allow secure attachment of the facade to the building. The mounting means may also extend out from the facade of the building, such to attach balcony floors to the facade.

[0024] In a preferred embodiment of the facade according to the invention, the facade element comprises:

- a metal frame having at least an upper frame part and a lower frame part for attachment to the adjacent

parallel mounting beams;

- at least one insulation layer, in which the frame is embedded; and
- a wall cladding layer arranged on the outside of the facade element.

[0025] The metal frame allows the facade element to be attached to the mounting beams that are attachable to the building. When mounting a facade element to one or more floors, the upper frame part is mountable to the mounting beam attachable at the upper end of the floors. The lower frame part is mountable to the lower mounting beam in a similar way.

[0026] The metal beam also may serve to enhance the integrity of the facade element, since common insulation materials generally have a lower mechanical stability compared to a metal frame. To this end, the metal frame is embedded in the insulation material.

[0027] There are various ways to embed the insulation material into the frame. It may for instance also be possible to have the metal frame to form a circumferential border around the insulation material.

[0028] The wall cladding layer serves to hide the insulation material from when the work is finished. In such a way, an ideal finish may be obtained. The wall cladding layer may further enhance the insulation effect of the facade as well. The wall cladding layer matches preferably with the pattern of wall cladding panel in order to achieve a corresponding pattern.

[0029] In a preferred embodiment of the facade according to the invention, the facade further comprises a window frame mounted in the metal frame.

[0030] In order to apply the facade to a building containing one or more openings, such as windows, it is recommended to provide the facade elements with openings corresponding to the location of the openings in the original facade of the building. In such a way, the installation of the facade will not obstruct the present openings.

[0031] In a preferred embodiment of the facade according to the invention, the wall cladding layer comprises an insulating rigid foam layer covered by a cladding finishing layer, such as stucco work or stone strips.

[0032] When the wall cladding layer comprises a cladding finishing layer, an ideal finish may be obtained. Thereby, the insulating layer and the other parts of the facade element are hidden from the outside appearance of the building. The wall cladding layer may as such serve to keep the change in the appearance of the building as minimal as possible.

[0033] The insulating rigid layer serves to further enhance the insulation of the building.

[0034] The object of the invention is further achieved with a method for renovating an old facade of a building having at least two floors, comprising concrete floor elements, which method comprises the steps of:

- removing any extending building parts, such as balconies, from the facade of the building;

- mounting parallel mounting beams to the concrete floor elements of each floor;
- providing a new facade element having a metal frame with at least an upper frame part and a lower frame part;
- positioning the new facade element between two parallel mounting beams;
- attaching the upper frame part and lower frame part to the parallel mounting beams.

[0035] Extending building parts from the mounting plane of the building will obstruct the attachment of the facade to the building. As a consequence, these extending building parts need to be removed in order to renovate the building. The balconies can be replaced with balcony floors, which are possibly fixed through the concrete floor elements.

[0036] By mounting the mounting beams to the concrete floor elements parallel to each other, the facade elements, which are preferentially rectangular, are easily aligned to the mounting beams. However, in case of buildings with a more peculiarly shaped wall, it may also be possible to use facade elements and/or mounting beams adjusted to that shape.

[0037] By the method according to the invention, the time required for renovating the building is shortened and the ease of renovation is increased.

[0038] In a preferred embodiment of the method according to the invention, the method further comprises the step of providing a sealing between a mounting beam and the concrete floor element.

[0039] The application of a sealing layer between the mounting beam and the building may further increase the tightness of the attachment of the mounting beam to the building. In addition, it may protect the old facade of the building and it may further enhance the insulation. The sealing layer may be provided with an opening in order to accommodate means used for mounting the mounting beams to the concrete floor element. In addition, the application of a sealing layer between the concrete layer and the mounting beam may form a cavity between the facade element when mounted, and the original outer wall of the building.

[0040] In a preferred embodiment of the method according to the invention, the method further comprises the step of removing window frames from the old facade of the building after the new facade elements have been mounted.

[0041] When the facade elements are attached to the building such that the window frames in the facade elements correspond to the location of the window frames of the building in the old outer wall, the insulation of a building with windows is increased. Removing window frames from the original facade of the building after installing the new facade will reduce the discomfort to the occupant of the building.

[0042] While the facade is described to be used for the insulation of a building against heat loss, it may also be

used, to isolate a building for other purposes, such as for instance soundproofing, to which methods similar considerations may apply.

[0043] These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a cross-sectional view of an embodiment of the facade according to the invention applied to a building.

Figure 2 shows a cross-sectional view of another embodiment of the facade according to the invention applied to a building.

Figure 3 shows a cross-sectional view of another embodiment of the facade according to the invention applied to a building.

[0044] Figure 1 shows a part of a multiple floor building wherein the first floor is shown comprising a concrete floor element 2. Before the application of the facade element according to the invention, the facade of the building 1 was formed by an inner wall 3 and an outer wall 4 and a cavity 5 between those walls. It is possible that wall 4 is not interrupted by the concrete floor element 2. The concrete floor element 2 may then only interrupt wall 3. To the outside of the outer wall 4, a vapour tight layer (not shown) may be applied. A mounting beam 6 is connected through mounting means 7, which mounting means 7 comprise anchoring means 8, to the concrete floor element 2. In between, a sealing layer 9 is provided. The mounting means 8 are threaded and comprise nuts 10 affixed on both sides of the mounting beam 6.

[0045] The web 11 of the mounting beam 6 is connected to the concrete floor element 2, whereas the flanges 12 are connected to facade elements 13 via fixing means 14. The area enclosed by the web 11 and the flanges 12 of the mounting beam 6 is filled with an insulation material 15.

[0046] Because of the sealing layer 9, the facade elements 13 are placed at a distance from the outer wall 4. Thereby, another cavity 16 is formed. In this embodiment, the facade element 13 comprises a stiffening plate 17 connected to the inner side of an insulation material 18. The insulation material 18 is surrounded by a metal frame 19. On the outside of the insulation material 18, a water repelling layer 20 is applied. The facade is completed by a wall cladding layer consisting of a layer of insulation material 21 and a finishing layer 22, in this case made of regularly spaced bricks 23.

[0047] Figure 2 shows a part of a multiple floor building 30 wherein the first floor is shown comprising a concrete floor element 31. To the outside of the concrete floor element 31, a mounting beam 32 is fixed by mounting means 33 with anchoring means 34. Between the concrete floor element 31 and mounting beam 32, a sealing layer 35 is provided. The mounting beam 32 is fixed in a similar way as in the embodiment of figure 1 to facade elements 36. The facade elements 36 comprise a window

frame 37 for a window 38 and is further provided with clamping means 39 for clamping a wall cladding layer 40 similar to the wall cladding layer 21, 22 in figure 1. After installing the facade elements 36, the old window frame (not shown), attached to floor part 41, can be removed.

[0048] In this embodiment, the mounting means 33 extend through the wall cladding layer 40 in order to further support a balcony 42 using anchoring means 43.

[0049] Figure 3 shows a part of a multiple floor building 50, wherein the first floor is shown comprising a concrete floor element 51. To the outside and further spaced apart from the concrete floor element 51 compared to figure 2, a mounting beam 52 is fixed by mounting means 53 with anchoring means 54. On the mounting beam 52, a fixing element 55 is attached that may be used to secure other objects such as balcony floors to the facade. The mounting beam 52 is installed in a similar way as in the embodiment of figure 1 and 2 to facade elements 56.

[0050] Because the embodiments shown in figures 1, 2 and 3 are similar to a certain extent, not all details of the facade are shown or discussed for each of the accompanying figures.

Claims

1. Facade for a building having at least two floors with concrete floor elements, which facade comprises;
 - mounting beams arranged parallel and in a mounting plane;
 - mounting means for mounting each mounting beam to an outer side surface of a concrete floor element of each floor;
 - at least one facade element arranged between two parallel mounting beams, wherein the at least one facade element comprises a metal frame having at least an upper frame part and a lower frame part attached to the adjacent parallel mounting beams.
2. Facade according to claim 1, wherein the mounting beams have a C-shaped cross-section, wherein the web of the beam is mounted by the mounting means and wherein the flanges of the beams are attached to an upper frame part or a lower frame part of the at least one facade element.
3. Facade according to claim 1 or 2, wherein the mounting beams are enveloped by insulation material and wherein a wall cladding panel is arranged to the mounting beams.
4. Facade according to any of the preceding claims, further comprising a balcony floor, which balcony floor is mounted along one side to the mounting means.
5. Facade according to any of the preceding claims, wherein the mounting means comprise a threaded rod, a number of nuts and anchoring means arranged at one end of the threaded rod for anchoring in a concrete floor element of a building.
6. Facade element for a facade according to any of the preceding claims, which facade element comprises:
 - a metal frame having at least an upper frame part and a lower frame part for attachment to the adjacent parallel mounting beams;
 - at least one insulation layer, in which the frame is embedded; and
 - a wall cladding layer arranged on the outside of the facade element.
7. Facade element according to claim 6, further comprising a window frame mounted in the metal frame.
8. Facade element according to claim 6 or 7, wherein the wall cladding layer comprises an insulating rigid foam layer covered by a cladding finishing layer, such as plasterwork or stone strips.
9. Method for renovating an old facade of a building having at least two floors, comprising concrete floor elements, which method comprises the steps of:
 - removing any extending building parts, such as balconies, from the facade of the building;
 - mounting parallel mounting beams to the concrete floor elements of each floor;
 - providing a new facade element having a metal frame with at least an upper frame part and a lower frame part;
 - positioning the new facade element between two parallel mounting beams;
 - attaching the upper frame part and lower frame part to the parallel mounting beams.
10. Method according to claim 9, further comprising the step of providing a sealing between a mounting beam and the concrete floor element.
11. Method according to claim 9 or 10, further comprising the step of removing window frames from the original facade of the building, after the new facade elements have been mounted.

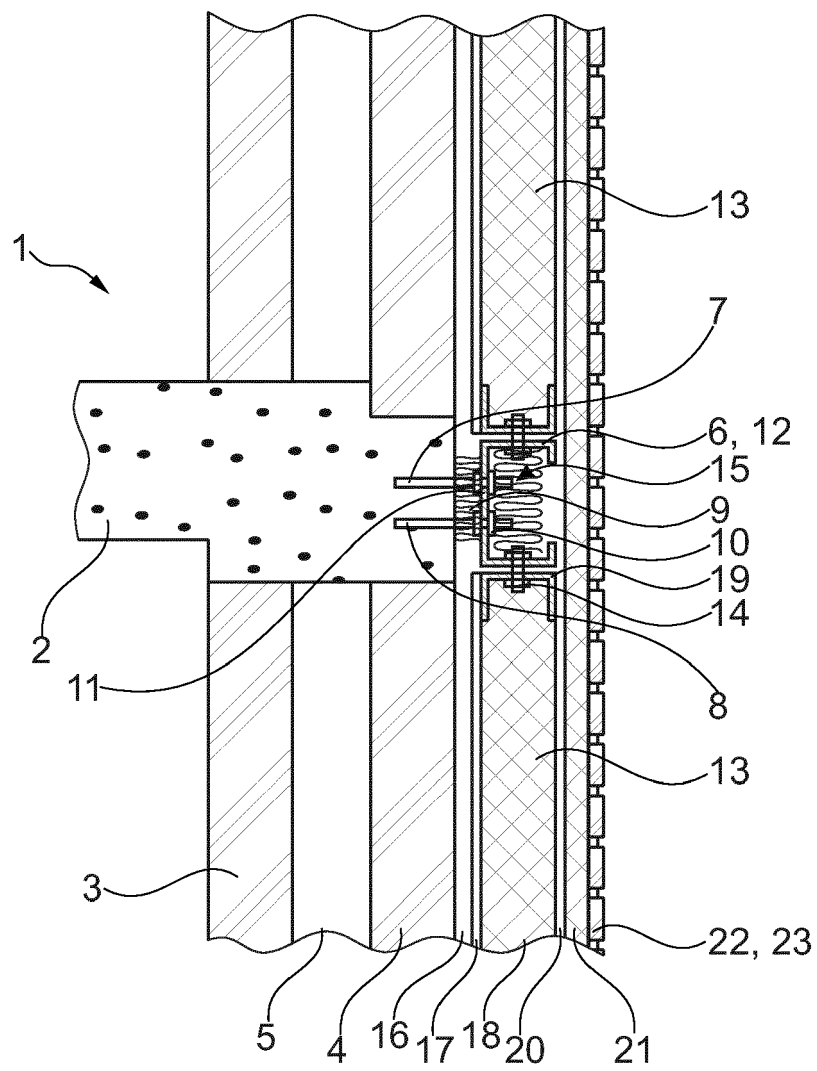


Fig. 1

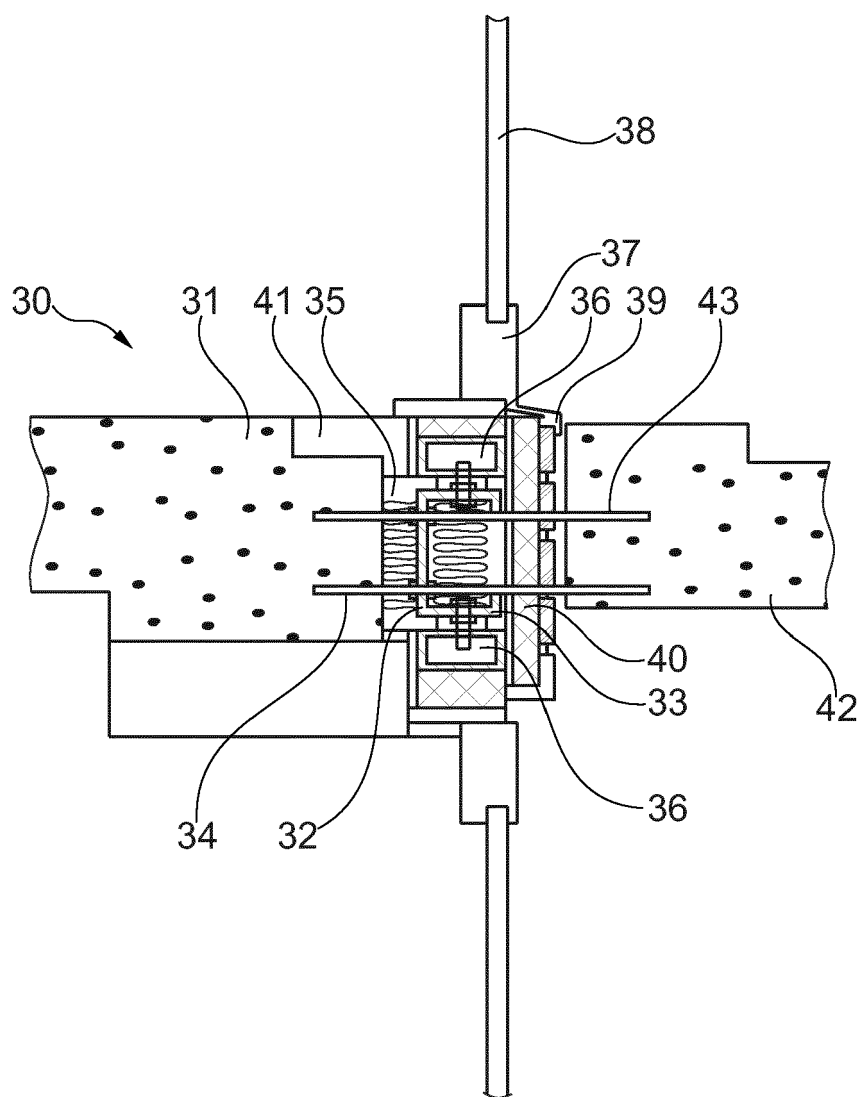


Fig. 2

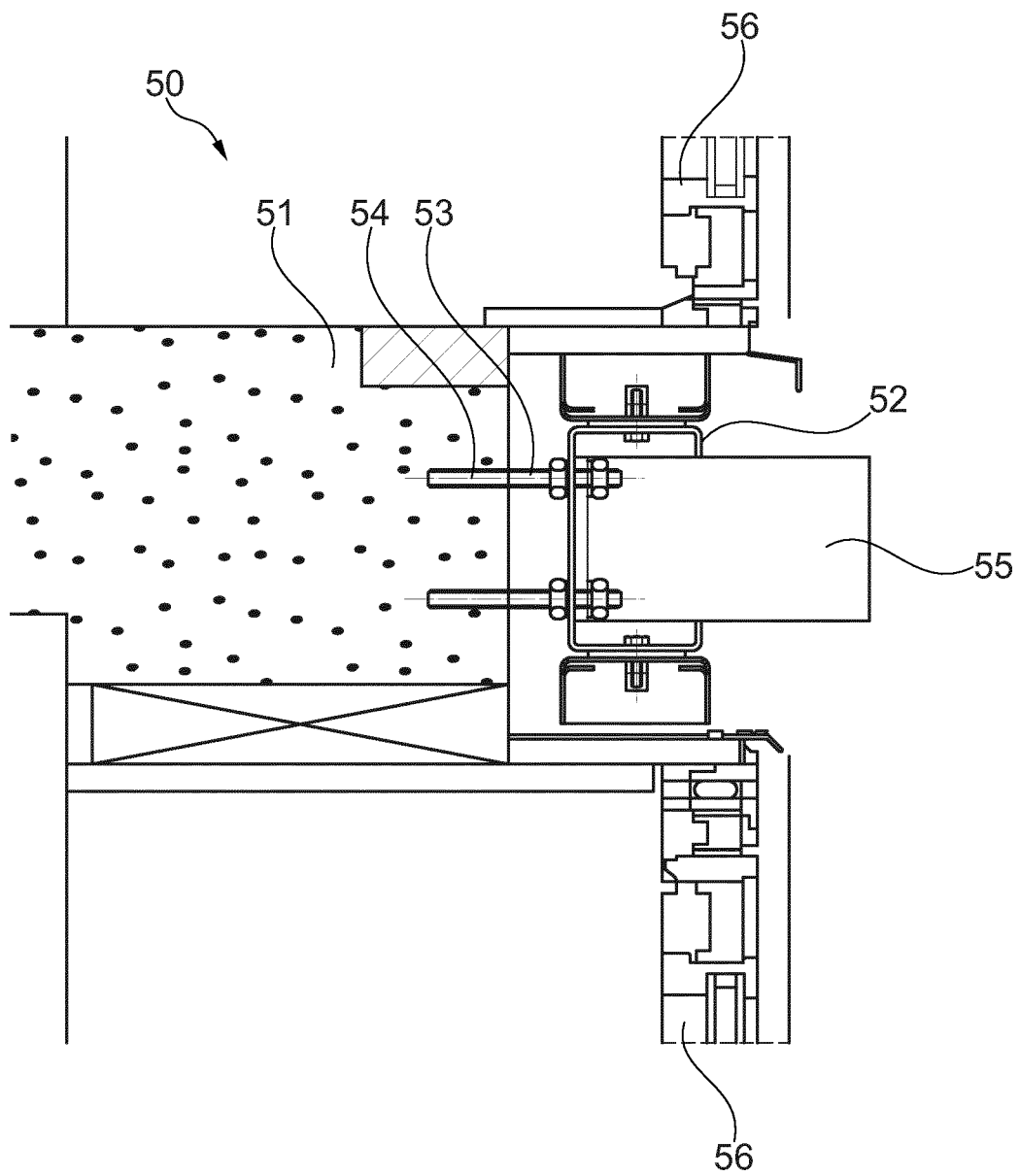


Fig. 3



EUROPEAN SEARCH REPORT

 Application Number
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The present search report has been drawn up for all claims				
Place of search Munich		Date of completion of the search 14 April 2014	Examiner Bourgoin, J	
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		

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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