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(54) **A building facade member and a set of fittings for external mounting in an opening in a building facade and a method of mounting such a facade member**

(57) A building facade member (49) is mounted over an opening in a building facade by means of a set of mounting fittings by turning the facade member (49) in a tilting movement following positioning of its lower horizontal hollow profile (52) relative to a first fitting member designed as a profiled rail member (58) mounted on the spandrel portion (59) of the facade opening, towards an unlocked position, in which the lower horizontal hollow profile (52) is supported by said profiled rail member (58).

At the end of said tilting movement, second and third fitting members (67, 69) mounted in the upper ceiling portion (68), and in longitudinally displaceable, but fixably relationship with a groove (56) at the upper side of the upper horizontal profile (51) of the facade member (51), respectively, are brought into mutual engagement, following which the third fitting member (69) is displaced and fixed into a locked position.

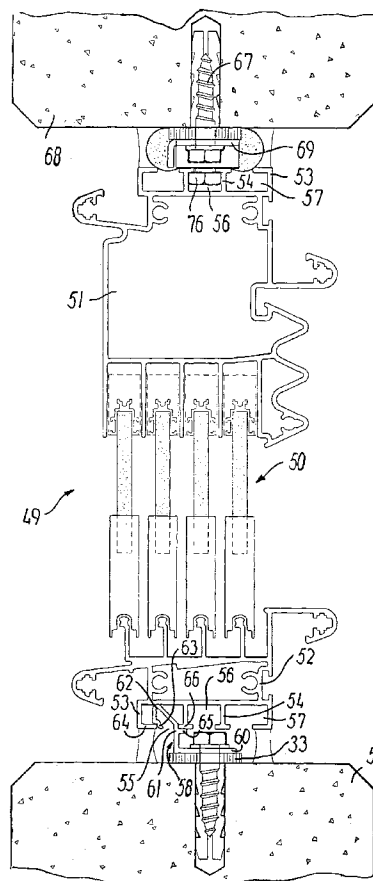


FIG.5

Description

The present invention relates to a combination of a building facade member manufactured as a framework structure and preferably composed of horizontal and vertical hollow profiles for external mounting over an opening in a building facade defined by a substantially horizontal lower spandrel portion and a substantially horizontal upper ceiling portion and a set of mounting fittings for mounting the facade member over said facade opening.

The object of the invention is in particular external mounting of building facade members of the type known from EP-A-0 474 582 and EP-A-0 687 783. Such a facade member may typically be designed as a framework structure comprising two horizontal and two vertical hollow profiles and adapted for mounting over an opening for a balcony, a door or a window or other types of facade openings in buildings.

In known facade members mounting is usually effected by fastening the facade member to the lower spandrel portion and the upper ceiling portion by means of fittings in the form of mounting angles of L, U or Z shape, or flat bars which are secured by screw or bolt connections.

When using this way of mounting, the facade member will typically project from the front of the building facade and thus not appear as an integral part thereof. The mounting of facade members by this method is furthermore very labour demanding and involves considerable costs, to which may be added that fittings of the above type will not normally be able to compensate for irregularities, if any, in and about the facade opening.

In another possible mounting method, the facade member is first placed directly resting, possibly with adjustment, on the spandrel portion, following which screw or bolt connections are established by drilling through hollow profiles and adjacent parts of the supporting building structure.

Such a drilling through the hollow profiles of the facade member entails a risk of moisture and water penetration with subsequent corrosion damage both to the profiles of the facade member and to the building reinforcement, and a weakening of the hollow profiles such that a reinforcement or overdimensioning is required, the result being additional costs.

In addition, it applies to both of the above-mentioned known mounting methods that the mounting process may be difficult to control in a safe way, since during part of the mounting, until fastening in the facade opening has taken place, the facade member is freely movable relative to the facade opening, ultimately involving the risk that the facade member gets completely out of control and is damaged or lost, which in the latter case entails the risk of damaging other objects or persons.

From US patent no. 2 475 885 it is known per se to mount a window member in a building facade from the

inside by means of pre-mounted fittings which are fastened to the spandrel and ceiling portions of the facade opening. The embodiments of framework profiles and mounting fittings proposed for this purpose are not suited, however, for external mounting.

On this background it is the object of the invention to provide a simple, quick and safe external mounting of facade members of the type stated above.

To meet this object the combination of a building facade member and a set of mounting fittings as defined above is characterized according to the invention, in that a lower horizontal hollow profile of the facade member and a first fitting member of the set of mounting fittings designed to be fastened on the spandrel portion of the facade opening are provided with mutually co-operating positioning and support members for predetermined positioning and support of the facade member in an unlocked position, and that second and third fitting members of the set of mounting fittings comprise mutually co-operating engagement and locking members mounted on the ceiling portion of the facade opening and on an upper horizontal hollow profile of the facade member, respectively, said third fitting member being longitudinally displaceable relative to said upper hollow profile between an engagement position, in which it is engageable with said second fitting member, and a fixable locking position, in which the second fitting member is retained in a locked position.

By this combination of the design of the building facade member and the accompanying set of mounting fittings a quick and simple temporary support and fixing of the facade member in the facade opening is obtained without any need for penetrating the hollow profiles of the facade member by drilled bores for screw or bolt connections. The individual parts of the set of mounting fittings may be mounted in the facade opening and on the facade member, respectively, before the handling of the framework structure of the facade member is initiated, whereby the risk that the facade member will get out of control during the mounting and get damaged or lost is minimized.

In a preferred embodiment of the combination the first fitting member comprises a profile member having an externally open recess for a first downwards extending wall portion from the bottom side of the lower horizontal hollow profile of the facade member and an internal groove for receiving a second downwards extending wall portion from said bottom side, the height of the first downwards projecting wall portion being bigger than that of the second downwards extending wall portion, such that said positioning of the facade member may be carried out through a tilting movement of the facade member after placement of the first downwards extending wall portion in said recess to bring the second downwards extending wall portion into supporting abutment against the bottom of said internal groove.

Thereby a quick and simple positioning of the facade member, and, in addition, a considerably improved

safety is obtained in relation to the above; mentioned known methods of mounting.

According to a further preferred embodiment, said upper horizontal hollow profile of the facade member is provided at its top side with an upwards opening groove of a preferably dovetailed cross section, and said second and third fitting members comprise a screw or bolt member for screwing into a bore at said ceiling portion and a locking fitting retained in longitudinally displaceable relationship with said groove and having a substantially horizontal wall portion, in which a groove is provided having an opening at a side edge of said wall portion for engaging a shaft portion of said screw or bolt member in an untightened condition thereof, the bottom of said groove being displaced relative in the displacement direction of the locking fitting, such that the locking fitting by said longitudinal displacement with respect to said opening may be brought into a retained engagement with the screw or bolt member prior to tightening of the holder.

The invention also relates to a method for mounting a building facade member of the type stated over an opening in a building facade by use of a set of mounting fittings as defined.

According to the invention this method is characterized in that after positioning of its lower horizontal hollow profile relative to the first fitting member designed as a profiled rail member the facade member is turned by a tilting movement towards said unlocked position, in which the lower horizontal hollow profile is supported by said profiled rail member, and that at the end of said tilting movement said second and third fitting members are brought into mutual engagement, following which the third fitting member is displaced and fixed in said locking position.

In connection with the above last-mentioned preferred embodiment of the combination a preferred embodiment of the method stated is characterized in that the groove in the substantially horizontal wall portion of said locking fitting is brought into engagement with said shaft portion of the second fitting member designed as a screw or bolt member, following which the screw or bolt member is tightened relative to the ceiling portion of the facade opening.

In the following the invention will be explained in further detail with reference to the schematic drawings, in which

Fig. 1 illustrates the mounting of a building facade member in a facade opening by means of a set of mounting fittings of conventional design,

Fig. 2 is a sectional view of a first embodiment of a building facade member with an associated set of fittings for mounting according to the invention,

Fig. 3 is a perspective view illustrating the co-operation between second and third fitting members of the set of mounting fittings shown in Fig. 2,

Fig. 4 shows an embodiment of a brick-shaped ad-

justing member for use in mounting a first fitting member of the set of mounting fittings,

Fig. 5 is a sectional view of a second embodiment of the building facade member with associated sets of mounting fittings,

Fig. 6 is a perspective view illustrating the design of the third fitting member of the set of mounting fittings shown in Fig. 5, and

Fig. 7 illustrates phases of the mounting process for a building facade member by means of a set of mounting fittings as shown in Fig. 5.

The building facade member 1 shown in Fig. 1 is manufactured as a framework structure with an upper horizontal hollow profile 2, a lower horizontal hollow profile 3 and vertical side profiles 4 and 5 and moreover comprises, in the embodiment shown, a horizontal middle portion 6, and in the lower one of the window openings 7 and 8 separated by said middle portion a glazing bar portion 9 which like the middle portion 6 may be designed as a hollow profile.

The facade opening 10 shown in the figure comprises a lower spandrel portion 11 and an upper ceiling portion 21 and is moreover defined by side walls 13 and 14.

For the mounting of such a building facade member conventional fittings may be used which comprise flat bars 15 and 16 fastened to the spandrel portion 11 of the facade opening and to the lower horizontal hollow profile 3 of the building facade member, respectively, and L-shaped angle-fittings 17 and 18 fastened to the ceiling portion 12 of the facade opening 10 and to the upper horizontal hollow profile 2 of the building facade member 1.

At the mounting, the fittings designed as flat bars and angle-fittings are brought into abutment against each other and connected with bolt and nut joints. Until this joining has been effected, the mounting is performed without any kind of safe guiding of the building facade member, and after the fastening by means of said bolt-nut-joints, the building facade member will be displaced and protrude in front of the building facade and so to speak be hanging on the outside thereof, such that subsequently an extensive flashing will be required in order to ensure the necessary tightness against water penetration and wind impact.

Fig. 2 shows in a simple and schematic design a possible embodiment of a building facade member 19 according to the invention with an upper horizontal hollow profile 21 and a lower horizontal hollow profile 22, which together with side profiles (not shown) encase a pane portion 20 which may be retained in conventionally designed recesses 23 and 24.

In the embodiment shown the lower horizontal hollow profile 22 has two wall portions 25 and 26 projecting downwards from the bottom side, of which a first downwards projecting wall portion 25 has a height greater than that of the second downwards projecting wall portion 26, whereas the latter wall portion has an L-shaped

cross section providing a foot member 27.

This design of the profile 22 is intended for positioning and provisionally supporting the building facade member relative to a first fitting member 28 of a set of mounting fittings designed for the mounting of the building facade member 19. The member 28 is formed as an elongate profiled rail member which at its top side is provided with an external opening recess 29 for positioning of the first downwards projecting wall portion 25 of the profile 22 and an internal groove 30 for accommodating the second downwards projecting wall portion 26 with the foot member 27.

The profiled rail member 28 is fastened to the lower spandrel portion 31 of the facade opening by means of screws 32, and with a view to ensuring a horizontal positioning of the member 28, one or more brick-shaped adjusting members 33 of a design e.g. as illustrated in Fig. 4, may be arranged between the profile member and the spandrel portion.

A second fitting member of the set of mounting fittings is fastened to the upper ceiling portion 34 of the facade opening, said second fitting member having the shape of a screw 35, which is screwed into a bore 36 in the ceiling portion 34.

The upper horizontal hollow profile 21 of the building facade member is at its top side provided with projecting, L-shaped wall portions 37 and 38 defining an upwards open groove 39 of a preferably dovetailed cross section.

For engagement with the screw 35 screwed into the ceiling portion 34, a third fitting member in the form of a locking fitting 40 is retained to be longitudinally displaceable, but fixable in the groove 39. As will be seen more clearly from Fig. 3, the locking fitting 40 comprises a substantially horizontal wall portion 41, in which a groove 43 is provided which opens at a side edge 42 of the wall portion 41, the bottom of said groove being displaced relative to the opening thereof in the direction of displacement of the locking fitting 40, which is defined by two substantially T-shaped foot members 44 and 45 corresponding to the cross sectional profile of the dovetailed groove 39. The foot members 44 and 45 may at their top side 79 furthermore be provided with fixing means (not shown), for instance small pins or the like, for engagement with the projecting wall portions 37 and 38 during the process of tightening.

In the embodiment shown the groove 43 is substantially L-shaped, such that, when the locking fitting 40 is in an engagement position, it may get into engagement with the screw 35 mounted in the ceiling portion of the facade opening at the end of the tilting movement of the facade member 19, by which the second downwards projecting leg 26 from the lower horizontal profile 21 is brought in supporting abutment against the groove 30 in the profiled rail member 28.

When this engagement has been effected, the locking fitting 40 is displaced in the groove 39 in the direction of the arrow 46 in Fig. 3 to take up a locking position, in

which the fitting 40 is retained relative to the screw 35 and fixed when the screw is tightened.

The method of mounting the facade member shown in tfig. 2 in the facade opening shown thus comprises an initial mounting of the profiled rail member 28 and the screw 35 in the spandrel and ceiling portions 31 and 34 of the facade opening and mounting of the longitudinal locking fitting 40 in the groove 39 in the upper horizontal profile of the facade member 19, such that all three fitting members of the set of mounting fittings have been mounted prior to commencing of the handling of the facade member 19.

The facade member 19 is then positioned relative to the profiled rail member 28 by bringing the first downwards projecting wall portion 25 of the lower horizontal profile 22 in abutment against the exterior recess 29 of the profiled rail member 28. By tilting the facade member about the axis of rotation thus determined, the second downwards projecting wall portion 26 with the foot member 27 is now brought into supporting abutment against the bottom of the groove 30 in the profiled rail member 28, and simultaneously the locking fitting 40, which has been mounted in the groove 39 in advance in a suitable engagement position, is brought into engagement with the screw 35, following which the locking fitting 40 is displaced to the locking position and fixed therein by tightening of the screw 35.

Both in connection with the mounting of the profiled rail member 28 in the spandrel portion 31 and of the screw 35 in the ceiling portion 34, a compensation for irregularities in the facade opening may be performed by an adjustment by means of one or more adjusting members 33 of the design shown in Fig. 4.

As will be seen from this figure, the brick-shaped adjusting member 33, which may be manufactured by moulding or punching from a suitable metal or plastics material, for instance nylon, may be designed as a comparatively flat disc-shaped member with an open recess 47 corresponding to the shaft diameter of the screw or bolt together with which the adjusting member is to be used, and with a projecting catch member 48 facilitating correct insertion of the adjusting member 33. To avoid projecting parts, the catch member 48 may at the mounting advantageously be turned to be positioned in parallel with the longitudinal direction of the hollow profile 51 or be provided opposite its free end with a weakening line 80 to be broken off after its insertion. The desired adjustment may be effected by the use of a suitable number of adjustment members 33. By punching the blocking up member the recess 47 and the catch member 48 may advantageously be of complementary shape. The adjusting member 33 may have a wedge-shaped cross section, such that two members which may be provided with engagement means on their surfaces may be pushed together from opposite sides to obtain an controllable adjustment height.

The balcony facade member 49 shown in Fig. 5 and having a sliding pane portion 50 is provided with an up-

per horizontal hollow profile 51 and a lower horizontal hollow profile 52 with a design in principle known from EP-A-0 687 783, three canals or grooves 55, 56 and 57 being formed by projecting L- and T-shaped wall portions 53 and 54, respectively, at the upper side of the upper profile 51 and at the bottom side of the lower profile 52, said canals or grooves having preferably a dove-tailed cross section.

The first fitting member of the set of fittings designed as an elongate profiled rail member 58 comprises a substantially plane wall portion 60 for abutment against the spandrel portion 59 of the facade opening, possibly through one or more adjusting members 33, and a wall portion 61 projection upwards therefrom and having a hook-shaped, bent edge portion 62, which may be introduced in the uttermost groove 55 in the bottom side of the lower horizontal profile 52 of the locking member 49.

At its free edge the edge portion 62 is provided with a recess 63 serving as abutment for an external, open edge portion 64, which is formed by the L-shaped wall portion 53, for the groove 55.

The second fitting member of the set of mounting fittings may like in the embodiment in Fig. 2 comprise a screw 67 for mounting in a wall peg in a bore in the ceiling portion 68 of the facade opening.

The third fitting member designed as a locking fitting may be designed in the same manner as shown in Fig. 3 suited for longitudinal and fixed mounting in the middle groove 56 of the three grooves 55 - 57 at the top side of the upper profile 51 of the facade member 49.

As more clearly visible in Fig. 6 the locking fitting 69 may in a modification be designed such that at the ends of the substantially horizontal wall portion 70, in which, in this case, a linear, tilting groove is provided, it is provided with staggered end portions 72 and 73 for bolts 74, the heads of which 75 are introduced in the groove 56. The fixing of the lock member 69 in the groove 56 may here be performed by tightening of nuts 76 positioned on the opposite side of the end portions 72 and 73, the locking fitting 69 being after engagement with the screw 66 displaced in the groove 56 into the locking position.

The method for mounting the facade member 49 in Fig. 5 is, as far as the positioning of the lower horizontal profile 52 of the facade member 49 is concerned, substantially identical with the one described above in respect of the embodiment in Fig. 2, such as will be seen from Fig. 7, which describes a) - e) various phases of the mounting process.

There is, however, in respect of the co-operation between the second and the third fitting members of the set of mounting fittings the difference that the locking of these members relative to each other comprises two steps, a tightening of the screw 66 mounted in the ceiling portion 68 being first performed, when the facade member 49 by means of a suitable adjustment has been brought in plumb, following which a tightening of the bolt/

nut joints 74 - 76 is performed with a subsequent alignment of the facade member 49 to uniform diagonal measures, the bolt heads 75 being thereby locked in the groove 56.

The invention is not limited to the embodiment shown of the hollow profiles and the fitting members, but may within the scopes of the succeeding claims be used in connection with hollow profiles of arbitrary cross sectional profiles.

The first fitting member of the set of mounting fittings does not necessarily have to be designed as a through-going profiled rail member, though this will normally be preferred.

The number of the second and third fitting members may be varied according to the size of the actual facade member.

Claims

1. A combination of a building facade member (19, 49) manufactured as a framework structure and preferably composed of horizontal and vertical hollow profiles (21, 22; 51, 52) for external mounting over an opening in a building facade defined by a substantially horizontal lower spandrel portion (31, 59) and a substantially horizontal upper ceiling portion (34, 68) and a set of mounting fittings for mounting the facade member over said facade opening, **characterized** in that a lower horizontal hollow profile (22, 52) of the facade member (19, 49) and a first fitting member (28, 58) of the set of mounting fittings designed to be fastened on the spandrel portion (31, 59) of the facade opening are provided with mutually co-operating positioning and support members for predetermined positioning and support of the facade member (19, 49) in an unlocked position, and that second and third fitting members of the set of mounting fittings comprise mutually co-operating engagement and locking members (35, 40; 67, 69) mounted on the ceiling portion (34, 68) of the facade opening and on an upper horizontal hollow profile (21, 51) of the facade member (19, 49), respectively, said third fitting member (40, 69) being longitudinally displaceable relative to said upper hollow profile (21, 51) between an engagement position, in which it is engageable with said second fitting member (35, 67), and a fixable locking position, in which the second fitting member (35, 67) is retained in a locked position.
2. The combination of claim 1, **characterized** in that the first fitting member comprises a profile member (28) having an externally open recess (29) for a first downwards extending wall portion (25) from the bottom side of the lower horizontal hollow profile (21) of the facade member (19) and an internal groove (30) for receiving a sec-

ond downwards extending wall portion (26) from said bottom side, the height of the first downwards projecting wall portion (25) being bigger than that of the second downwards extending wall portion (26), such that said positioning of the facade member (19) may be carried out by a tilting movement of the facade member (19) after placement of the first downwards extending wall portion (25) in said recess (29), to bring the second downwards extending wall portion (26) into supporting abutment against the bottom of said internal groove (30).

3. The combination of claim 2,

characterized in that said second downwards extending wall portion (26) has an L- or a T-shaped cross-sectional profile providing a foot member (27) for abutment against the bottom of said internal grooves.

4. The combination of claim 1,

characterized in that the lower hollow horizontal profile (52) of the facade member (49) is provided at its bottom side with a downwards opening groove (55) with a preferably dovetailed cross section, and that the first fitting member is designed as a profiled rail member (58) comprising a wall portion (61) extending upwards from a substantially plane wall portion (60) for abutment against the spandrel portion (59) of the facade opening, said upwards extending wall portion (61) having an edge portion (62) bent into hook-shape for insertion into said groove (55), said edge portion (62) being provided at its free edge with a recess (63) serving as abutment for an external opening edge portion (64) of said groove (55), said upwards extending wall portion (61) having at its side opposite said edge portion (62) an externally protruding abutment flange (65) as a support for an internal opening edge member (66) of said groove (55) following a tilting movement of said lower hollow profile (52) about the hook-shaped edge portion (62) of the profile member (58) inserted in said groove (55).

5. The combination of any of the preceding claims, **characterized** in that said upper horizontal hollow profile (21, 51) of the facade member (19, 49) is provided at its top side with an upwards opening groove (39, 56) of a preferably dovetailed cross section, and in that said second and third fitting members comprise a screw or bolt member (35, 67) for screwing into a bore at said ceiling portion (34, 68) and a locking fitting (40, 69) retained in longitudinally displaceable relationship with said groove (39, 56) and having a substantially horizontal wall portion (41, 70), in which a groove (43, 71) is provided having an opening at a side edge (42) of said wall portion for engaging a shaft portion of said screw or bolt member (35, 67) in an untightened condition there-

of, the bottom of said groove (43, 71) being displaced relative in the displacement direction of the locking fitting (40, 69), such that by said longitudinal displacement with respect to said opening the locking fitting (40, 69) may be brought into a retained engagement with the screw or bolt member (35, 67) prior to tightening of the holder.

6. The combination of claim 5,

characterized in that in connection with said substantially horizontal wall portion (41) on each side of the groove (43) provided therein said locking fitting (40) comprises two substantially T-shaped foot members (44, 45) for insertion into said groove (39) at the top side of the upper horizontal hollow profile (21) of the facade member (19).

7. The combination of claim 5, **characterized** in that said locking fitting (69) is provided at the ends of said substantially horizontal wall portion (70), with end portions (72, 73) displaced relative to said wall portion (70) and provided with holes for bolts (74), the heads of which (75) have been introduced in said groove (56) at the top side of the upper horizontal hollow profile (51) of the facade member (49), which bolts (74) by tightening of nuts (76) positioned on the side of said end portions (72, 73) which is opposite relative to said bolt heads (75) may fix the locking fitting (69) relative to said groove (56), following placement of said shaft member of the second fitting member designed as a screw or bolt member (67) in the bottom of the groove (71) in the substantially horizontal wall portion (70) of the locking fitting (69).

8. The combination of any of claims 5, 6 or 7, **characterized** in that the groove (43) in the substantially horizontal wall portion of the locking fitting (40) is substantially L-shaped.

9. The combination of any of claims 5, 6 or 7, **characterized** in that the groove (71) in the substantially horizontal wall portion of the locking fitting (69) is substantially linearly tilted relative to said side edge of the wall portion (70).

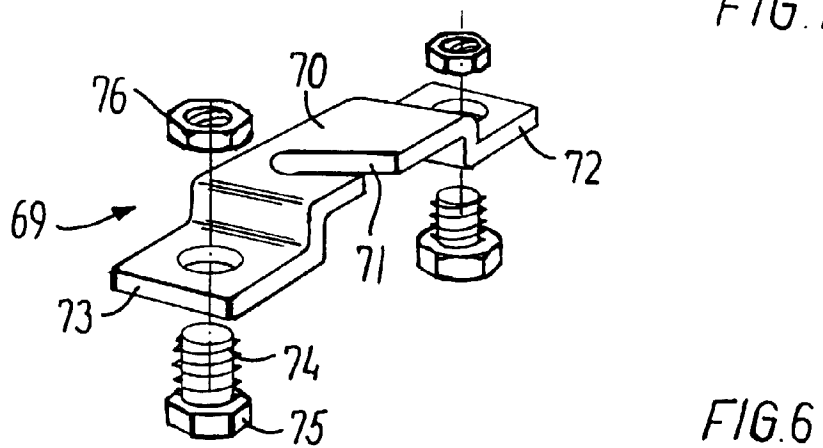
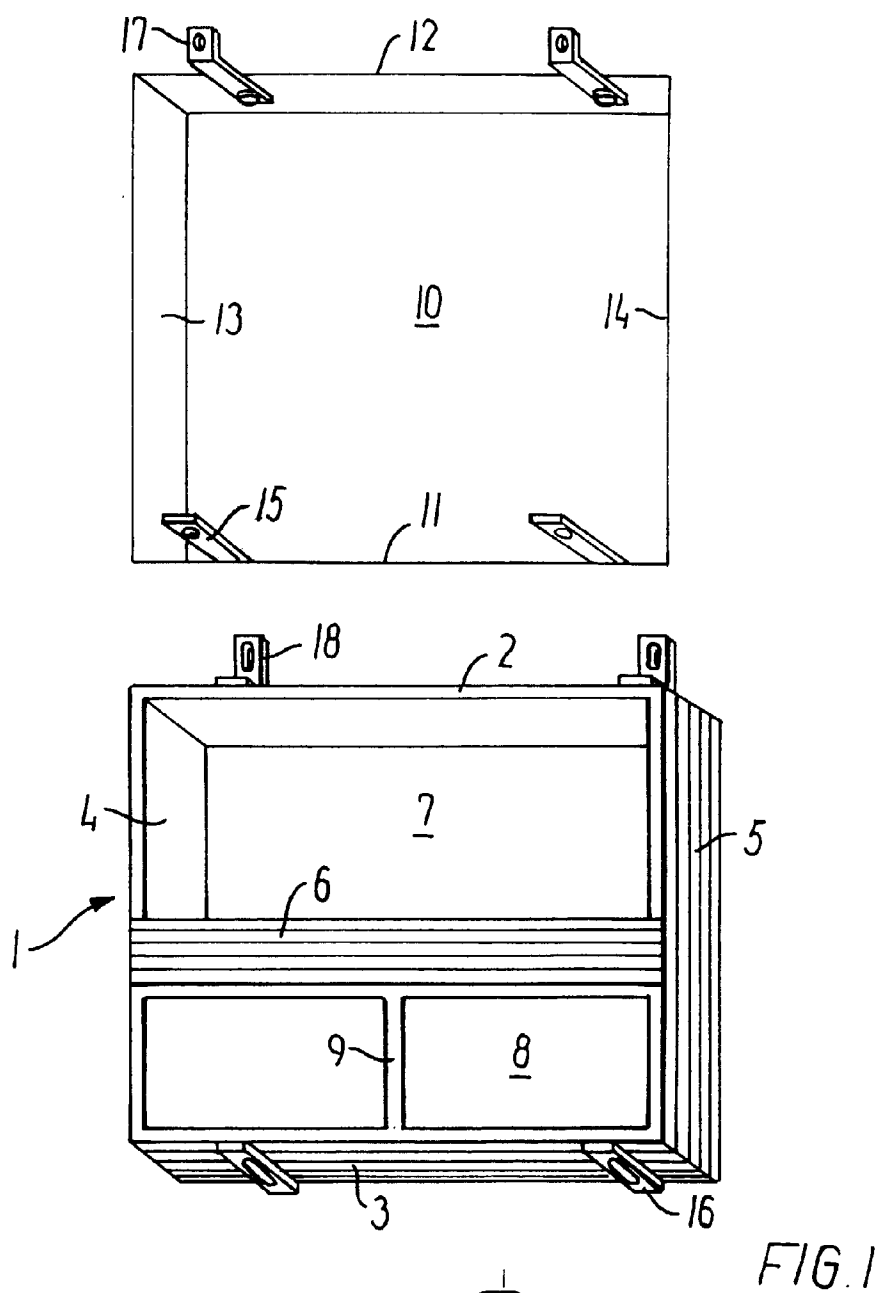
10. The combination of any of the preceding claims, **characterized** in that the set of mounting fittings further comprises screws or bolts (32) for fastening of the first fitting member designed as an elongate profiled rail member (28) to the spandrel portion (31) of the facade opening and a brick-shaped adjusting member (33) for positioning below the elongate profiled rail member (28) and engaging a shaft portion of said screws or bolts (32).

11. The combination of claim 10, **characterized** in that said adjusting member (33)

comprises an open recess (47) corresponding to said shaft portion and an protruding catch member (48).

12. The combination of claim 11,
characterized in that opposite its free end said catch member (48) is provided with a weakening line (80). 5
13. The combination of claims 10, 11, or 12, **characterized** in that the cross section of the adjusting member is wedge-shaped. 10
14. A method for external mounting of a building facade member (19, 49) as claimed in any of the preceding claims in an opening in a building facade by use of a set of mounting fittings as claimed in any of the preceding claims, **characterized** in that after positioning of its lower horizontal hollow profile (22, 52) relative to the first fitting member designed as a profiled rail member (28, 5) the facade member (19, 49) is turned by a tilting movement (Figs 7a - 7d) towards said unlocked position (Fig. 7e), in which the lower horizontal hollow profile (22, 52) is supported by said profiled rail member (28, 58), and that at the end of said tilting movement said second and third fitting members (35, 40; 67, 69) are brought into mutual engagement, following which the third fitting member (40, 69) is displaced and fixed in said locking position. 15
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15. A method according to claim 14 using a mounting fitting set as claimed in any of claims 5 - 9, **characterized** in that the groove (43, 71) in the substantially horizontal wall portion (41, 70) of said locking fitting (40, 69) is brought into engagement with said shaft portion of the second fitting member designed as a screw or bolt member (35, 67), following which the screw or bolt member (35, 67) is tightened relative to the ceiling portion (34, 68) of the facade opening. 35
40
16. A method according to claim 15 using a set of mounting fittings comprising a locking fitting as claimed in claim 7, **characterized** in that the locking fitting (69) is fixed relative to said groove (56) at the top side of the upper horizontal profile (51) of the facade member (49) by tightening of the bolts (74) introduced in said groove (56) by means of said nuts (76), prior to tightening of said screw or bolt member (67) relative to said ceiling portion (68). 45
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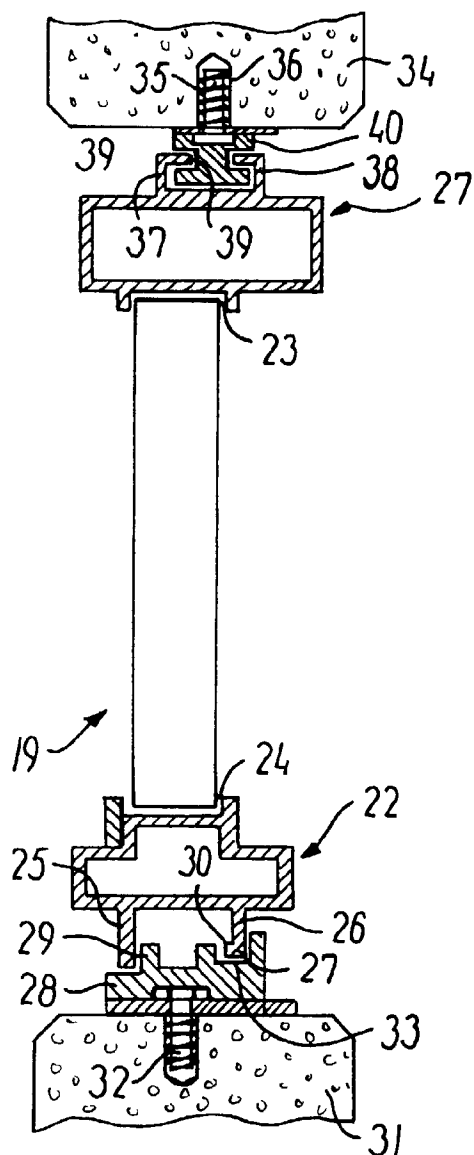


FIG. 2

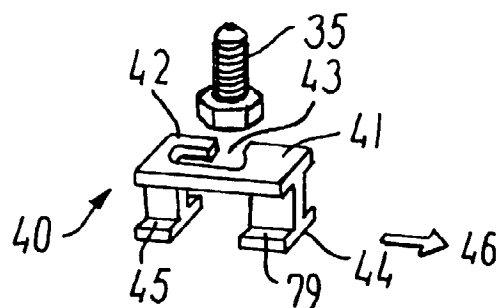


FIG. 3

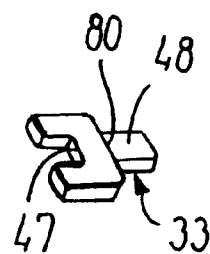
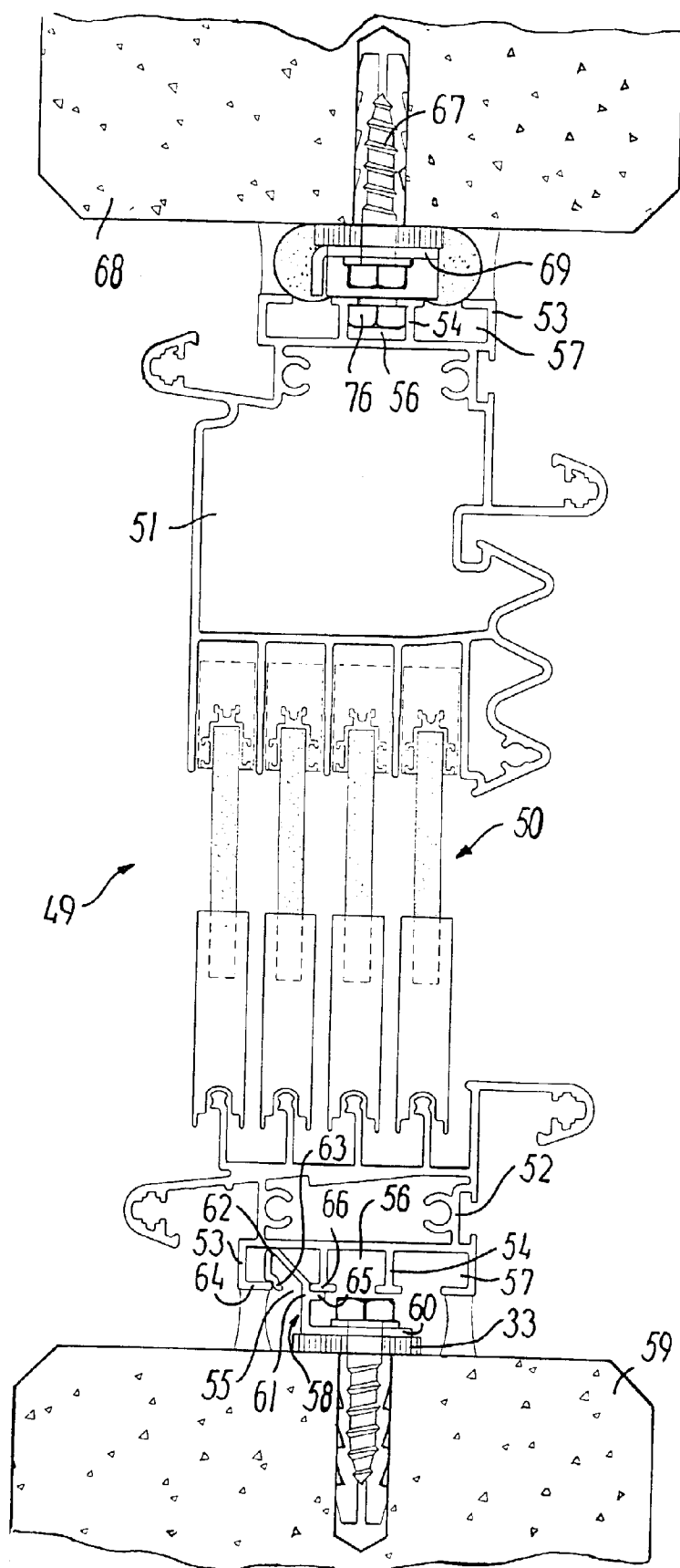


FIG. 4



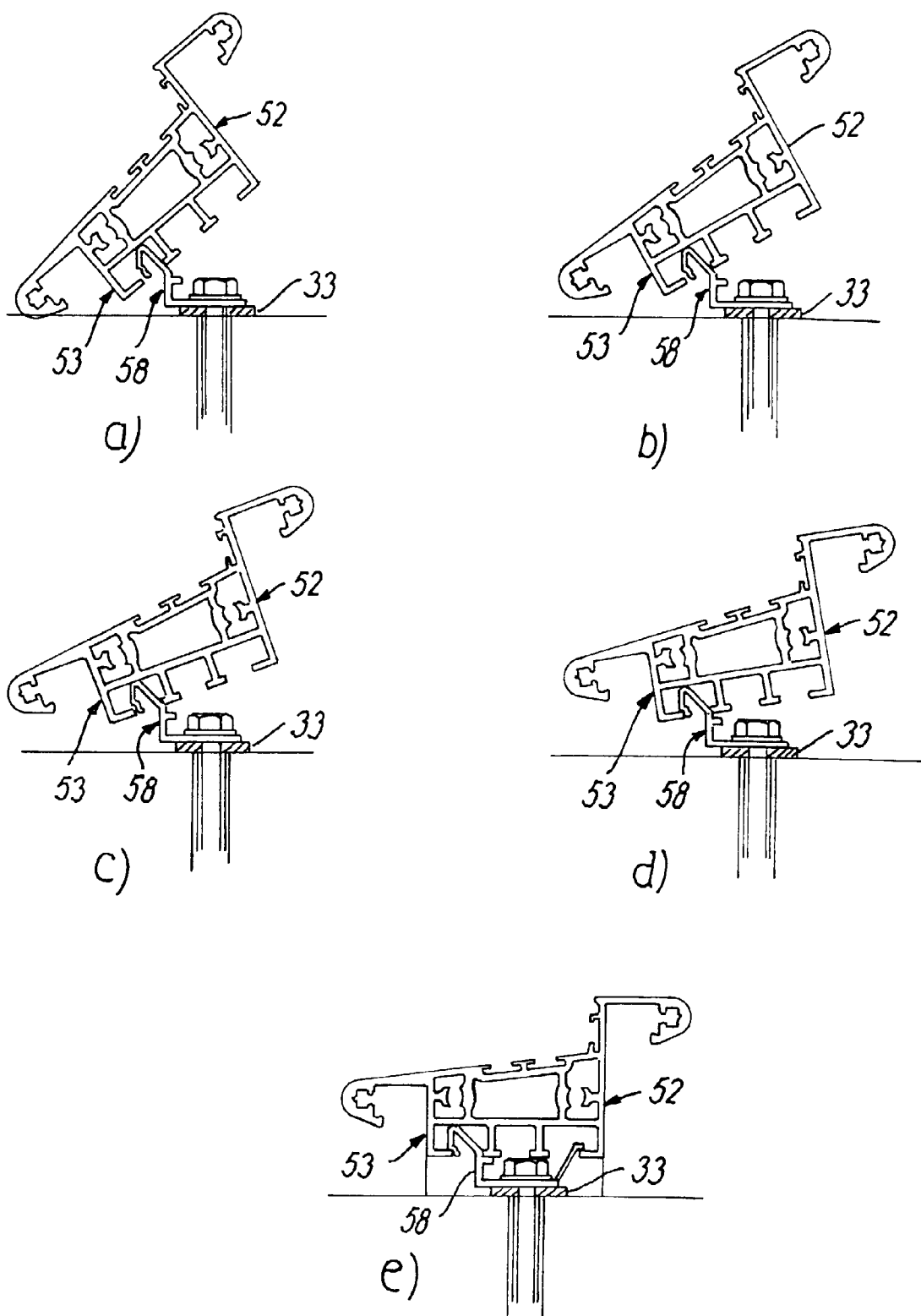


FIG. 7