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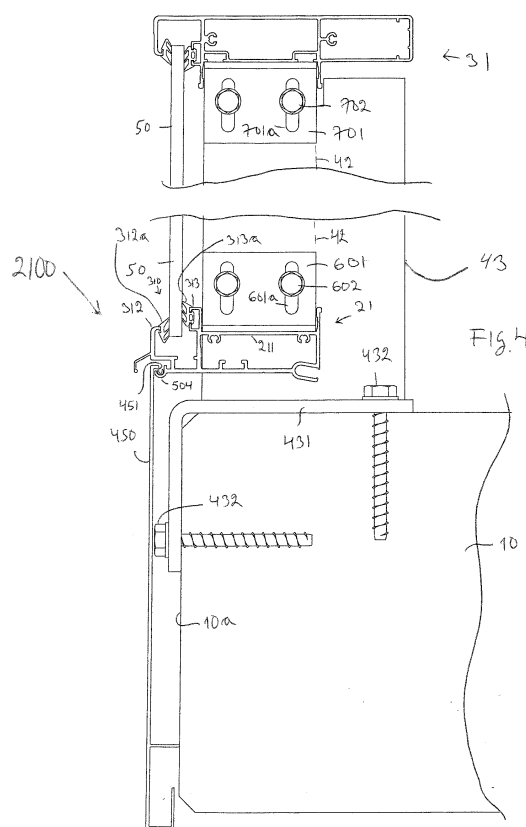
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(54) **Balcony railing structure**

(57) The invention relates to a balcony railing structure comprising a horizontal lower profile (21), a horizontal upper profile (31) and, further, a vertical post structure to connect the lower profile and the upper profile. The post structure comprises a support post (43) penetrating through the lower profile via an indentation penetrating through the uniform lower profile. The railing structure comprises a fastening arrangement (431, 432) for fastening a lower end of the support post to a balcony slab (10), and the railing structure comprises a height position adjustment arrangement (60, 602) between the lower profile (21) and the support post (43) and a height position adjustment arrangement (431, 432) between the upper profile (31) and the support post (43).



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Description

Field

[0001] The invention relates to a balcony railing structure comprising a horizontal lower profile, a horizontal upper profile and, further, a vertical post structure to connect the lower profile and the upper profile.

Background

[0002] For the sake of safety of those on a balcony, a front edge of the balcony is provided with a railing structure. A railing structure equipped with cover plates also serves as a privacy and wind screen.

[0003] The railing structure is most often fastened to a side of a balcony slab, i.e. in practice to a front edge of the balcony slab.

[0004] Another basic manner also utilised in the present invention is to have the railing structure on the balcony slab. In known solutions, inside the vertical post of the railing, at the bottom end thereof, a reinforcement made of steel is provided, welded to a uniform, about 150x150 mm steel plate of about 15 mm in thickness which, in turn, is bolted to the balcony slab. In these railing models, each post of the railing extends all the way to the balcony slab while glass covers covering the railing are supported on a glazing profile fastened to the side of these vertical posts.

[0005] In such a structure, ordinary vertical posts are responsible for supporting the upper horizontal part of the railing, but they are not in an optimal manner nor efficiently enough capable of resisting horizontal loads caused, for instance, by strong wind and collision with the railing in difficult conditions. Structural stability also against horizontal load would be important, and the problem becomes more serious if balcony glazing together with its movable glass elements or panels is mounted to rest on the upper horizontal part of the balcony railing since in such a case the upper horizontal part of the railing serves as a lower rail, such as a lower profile, for supporting the sliding of the glass elements of the balcony glazing, the stability of the position of the lower rail or profile thus playing an important role. The problem also escalates if the vertical surfaces of the side walls of the balcony are provided with insulating plaster since it does not enable the ends of the upper horizontal part of the railing to be fastened to the surface of the side walls of the balcony by means of angle pieces. Increasing the number of vertical posts, i.e. decreasing the span length, in turn, increases costs and the amount of installation work. Architects also often tend to prefer long spans between the posts.

[0006] It is known to provide an additional post inside the railing line, i.e. on the side of the useful area of the balcony. In other words, such an embodiment employs a support post to support the railing at the middle post, the support post being e.g. a 120x50 mm steel post in-

cluding its welded slab fastenings at the bottom end. The support post is massive, and it is fastened in front of an ordinary vertical post provided in the railing such that it does not come into contact with the railing and resides inside the railing, and the railing is supported on the additional post at the upper end by means of a fastener.

[0007] In their current form, the known solutions described above are not satisfactory since they have problems with achieving a sufficient structural strength for resisting horizontal loads in particular without the structure taking up the useful area inside the balcony or, owing to its protrusion inside the railing line or otherwise, disturbing those on the balcony or being architectonically problematic.

[0008] Thus, a need exists for a novel balcony railing structure.

Brief description

[0009] An object of the invention is to implement an improved balcony railing structure. This object is achieved by a balcony railing structure which is characterized in that the post structure comprises a support post penetrating through the lower profile via an indentation penetrating through the uniform lower profile, and that the railing structure comprises a fastening arrangement for fastening a bottom end of the support post to a balcony slab, and that the railing structure comprises a height position adjustment arrangement between the lower profile and the support post and a height position adjustment arrangement between the upper profile and the support post.

[0010] Preferred embodiments of the invention are disclosed in the dependent claims. The preferred embodiments enhance the advantages of the basic invention.

[0011] The balcony railing structure according to the invention enables several advantages to be achieved, such as a high resistance against horizontal loads and an ability to keep the useful area of the balcony large and without the railing structure disturbing the use of the balcony. It is possible to achieve a high resistance against horizontal loads without an overdense post structure, i.e. without a very short span length. The invention is also good in terms of manufacturability, installability and costs, and it is also architectonically good.

List of figures

[0012] The invention is now described in closer detail in connection with preferred embodiments and with reference to the accompanying drawings, in which

Figure 1 shows a bottom part of a railing structure as viewed from an end of a lower profile,
Figure 2 shows the bottom part of the railing structure from an obliquely forward direction,
Figure 3 shows a balcony with a railing structure, and
Figures 4 and 5 show a railing structure according

to the invention as viewed in a direction of the railing, as in Figure 1.

Description of embodiments

[0013] Referring to the figures, an intended application is a balcony 1 with a balcony slab 10, which is e.g. a concrete slab 10 of suitable strength, either an element or a piece cast in place. A railing structure 20 comprises a lower profile 21, such as a lower rail 21, on top of the balcony slab. In addition, the railing structure 20 comprises an upper profile 31, such as an upper rail 31, and posts 41 to 42, 44 to 45 between the lower profile 21 and the upper profile to support the upper profile. The railing structure also comprises a cover plate structure 50 formed from one or more pieces. The cover plate structure 50 may be a railing glass or plate, for instance.

[0014] The lower profile 21 may be an aluminium strip, such as a profile strip, made by extrusion, for instance. The lower profile 21 of the balcony railing comprises a support structure 210 extending in the longitudinal direction of the lower profile to support a bottom part of one or more railing posts 41 to 45. The lower profile 21 of the balcony railing further comprises in the same profile a support structure 310 extending in the longitudinal direction of the lower profile for supporting the cover plate structure 50 of the balcony railing from below. In other words, the support structure 310 supporting the cover plate structure 50, i.e. the glass strip, is part of the same integrated lower profile where the support structure 210 for the railing posts is also provided.

[0015] The support structure 210 for the one or more railing posts 41 to 42, 44 to 45 in the lower profile 21 comprises a transverse support 211 that supports the post from below and side supports 212, 213 that support the post on its edges, on different sides of the bottom end of the post.

[0016] The support structure 310 integrated into the same lower profile 21 for supporting the cover plate structure 50 comprises side supports 312, 313 which, through seals 312a, 313a fastened to the side supports 312, 313, support the cover plate structure 50 at its bottom part.

[0017] Figures 1 to 3 show that the outer side support 212 of the support structure 210 supporting the post from below comprises as a structure projecting outwards therefrom a side support 313, which thus constitutes the inner side support 313 of the cover plate structure 50.

[0018] Figures 1 to 3 show that in an embodiment, the support structure 210, 211 to 213 for supporting the bottom part of one or more railing posts 41 to 45 and the support structure 310, 312, 313 for supporting the bottom part of the cover plate structure 50 of the balcony railing reside substantially parallel when viewing the lower profile from a direction of its end.

[0019] The seals 312a, 313a may be made of rubber or silicone, for instance. Figure 4 shows no seals 312a, 313a. The inner side support 313 of the cover plate structure in the lower profile 21 is provided with a chamber for

the inner seal 313a while the outer side support 312 is provided with a bracket for the chamber of the outer seal 312a.

[0020] The structure in question is thus a balcony railing structure comprising a horizontal lower profile 21, a horizontal upper profile and, further, a vertical post structure 41 to 42, 44 to 45 to connect the lower profile 21 and the upper profile 31.

[0021] Figures 4 to 5 in particular show a support post 43. The post structure comprises a support post 43 penetrating through the lower profile 21 via an indentation 21a penetrating through the uniform lower profile 21. The railing structure comprises a fastening arrangement 431 to 432 for fastening a bottom end of the support post to a balcony slab, and the railing structure comprises a height position adjustment arrangement 601 to 602 between the lower profile and the support post and a height position adjustment arrangement 701 to 702 between the upper profile 31 and the support post 42. The fastening arrangement may comprise a support plate 431 welded under the support post 43, and a fastening member 432 for fastening the support post 43 via the support plate 431 to the balcony slab 10.

[0022] In Figure 4, behind the support post 43 is provided a bearing post which is shorter in the transverse direction and has a width of e.g. 70 mm and a rear edge, i.e. an edge facing the balcony, i.e. in Figure 4 the right-hand edge, shown in broken line.

[0023] A front edge, i.e. an edge facing outdoor air, i.e. in Figure 4 the left-hand edge, of the bearing post 42 remains in Figure 4 at the left edge of the support post 43, behind it. The support post 43 may be 120 mm in width, for instance.

[0024] Figure 5, in turn, shows the support post 43 and a previous bearing post 44 closer to the viewer, the bearing post 44, like the other bearing posts 41 to 42, 45 as well, resting on the lower profile 21, fastened thereto.

[0025] In addition to the support post 43, the post structure may comprise at least two vertical bearing posts 41 to 42, 44 to 45 provided on the lower profile 21, under the upper profile 31, fastened by fastening members 801 to 802 to the lower profile 21 and the upper profile 31 to form a uniform entity from the lower profile 21, the bearing posts 41 to 42, 44 to 45 and the upper profile 31. The height position of this uniform entity is adjustable by the height position adjustment arrangements 601 to 602, 701 to 702 in relation to the support post 43 indented through the lower profile 21 and fastenable by means of the fastening arrangement 431 to 432 to the balcony slab.

[0026] The bearing post, such as 42 and 44, is by means of the fastening member 801 fastened to the lower profile 21 via the integral support structure 210, 211 to 213 comprised by the lower profile 21.

[0027] The railing structure receives a horizontal load on the support post 43. The other posts, i.e. the bearing posts 41 to 42, 44 to 45, reside between the handrail, i.e. the upper profile 31, and, on the other hand, the lower profile 21, connecting the upper profile 31 and the lower

profile 21. Even the support post 43, though, contributes to connecting the upper profile 31 and the lower profile 21 in the sense that the upper profile 31 and the lower profile 21 together with the bearing posts 41 to 42, 44 to 45 therebetween are fastened so as to rest on the support post 43 by means of the height position adjustment arrangements 601 to 602, 701, 702, such as angle brackets 601, 701 and fastening members 602, 702 provided with an adjustment groove 601 a, 701 a, for instance, as can be seen in Figure 4. Figure 5 shows no such height position adjustment arrangements. The support posts 41 to 42, 44 to 45 receive a vertical load. The fastening members 602, 702 are e.g. bolts having nuts (not shown) as their counterpiece on the other side of the post, i.e. the bolts 602, 702 penetrate through the post 43.

[0028] Next, the mutual relationship of the support posts and the bearing posts will be discussed.

[0029] In an embodiment, the bearing posts, such as 42, 44, and the support post 43 are placed such that the support post 43 resides within an area between the bearing posts, most preferably such that the support post 43 resides within the area between the bearing posts 43, 44 substantially at the midpoint.

[0030] A range of the support post 43 in the transverse direction of the railing structure is greater than a range of the bearing post 42, 44 in the transverse direction of the railing structure. This is implemented particularly as a version wherein the front edge, i.e. the edge facing outdoor air, of the support post 43 is substantially aligned with the front edges of the bearing posts 41 to 42, 44 to 45. Consequently, the rear edge of the support post 43, i.e. in Figures 4 to 5 the right-hand edge, i.e. the edge facing the balcony in the support post 43, extends farther, i.e. more into the balcony area, than the rear edge of the bearing post 41 to 42, 44 to 45. The lower horizontal profile 21 is indented at the support post 43, enabling the same depth level as with the bearing posts 41 to 42, 44 to 45 to be reached when viewing the position of the support post 43 and the bearing post, such as 41 to 42, 44 to 45, in the transverse direction of the railing.

[0031] Referring to Figures 4 to 5, when viewing the upper profile 31, such as the handrail of the railing, an embodiment is implemented such that the range of the upper profile 31 in the transverse direction of the railing structure is greater than the range of the bearing post 41 to 42, 44 to 45 in the transverse direction of the railing structure. Also, the range of the upper profile 31 in the transverse direction of the railing structure is at least as great as the range of the support post 43 in the transverse direction of the railing structure. In such a case, the both post types, i.e. the support post 43 and the bearing post, such as 41 to 42, 44 to 45, reside within an area of a projection below the upper profile 31, making the implementation sensible as far as use and aesthetics are concerned.

[0032] Referring to Figures 1 to 2, in an embodiment the lower profile 21 of the balcony railing further comprises in the same profile a water control surface 401, as in

Figures 1 to 2, or a connecting structure for a water control surface. The water control surface 401 is a structure called an external sill.

[0033] The water control surface 401 comprises a descending surface 401 a receding outwards from the lower profile 21, i.e. in the direction of outdoor air, i.e. a surface oriented diagonally downwards, and a substantially vertical second surface 401 b serving as an extension thereof. It can be seen that the second surface 401 b is substantially parallel with the side supports 212, 213 and 312, 313.

[0034] Referring to Figures 1 to 2 in particular, the water control surface 401, i.e. the external sill, in the lower profile 21 is part of the same integral entity as the support structure 210, 211 to 213 for supporting the bottom part of the one or more railing posts 41 to 42, 44 to 45 and the support structure 310, 312, 313 for supporting the bottom part of the cover plate structure 50 of the balcony railing. Consequently, the element in question is the lower profile 21 of the balcony railing to be installed on the slab 10, wherein in the same profile a bearing/support profile for the railing glass of the balcony railing or a corresponding cover plate 50 as well as an external sill profile are also provided.

[0035] Referring to Figures 4 to 5, as an additional part, a lower profile structure 2100 comprises a cover profile 450 to be placed to rest on the lower profile 21 in order to cover a face 10a of the balcony slab 10. The lower profile 21 comprises in the same profile an integral connecting structure 504 for the cover profile 450 of the face of the balcony slab. The connecting structure 504 provided in the lower profile 21 for the cover profile 450 of the face 10a of the balcony slab 10 forms a bearing structure for a counterpiece 451 comprised in an upper part of the cover profile 450.

[0036] Referring to Figures 1 to 2, a height adjuster 500 to 501 associated with the lower profile 21 is provided for adjusting the height position of the lower profile 21 in relation to the balcony slab 10. This enables the effect of inclination of the balcony slab to be eliminated, i.e. the lower profile 21 to be positioned horizontally even if the balcony slab 10 were slanted. For the use of the height adjuster 500 to 501, the lower profile 21 comprises in the surface 211 a through hole 505 which is substantially penetrable in the vertical direction, i.e. the adjustment is carried out by a tool through the surface 211 from top towards bottom by means of a driver 500a, i.e. a turning point, provided in the middle of the part 500. The height adjuster 500 to 501 includes a male thread sleeve 500 rotatable from above by its driver and cooperating with a female thread sleeve 501 provided in a hole penetrating through the lower surface of the lower profile 21. The driver 501 a is a hexagon socket base, for instance. The rotatable male thread sleeve 500 is fastened to the balcony slab 10 by a screw 500b. In Figure 1, the through hole 505 is covered by a shield plug 506 after the adjustment has been made.

[0037] In the novel railing structure, the support post

43 replaces a thin, lightly fastened bearing post in any case already provided in the railing. The basic shape of this support post 43 may be similar to that of the bearing posts 41 to 42, 44 to 45 but the size of the support post 43 may be 20 mm x 120 mm, i.e. in the direction of the railing 20 mm and in a direction transverse to the railing 120 mm, whereas the bearing posts may be 20 mm x 70 mm. The support post 43 may be 1210 mm in height, for instance.

[0038] The lower profile 21 is uniform, i.e. it remains unbroken even if it is provided with an indentation for the support post. The lower profile 21 is indented for the support post 43, and the support post 43 penetrates through the lower profile 21. The support post 43 is fastened at a steel plate 431 welded to the bottom end of the support post 43 or at another support piece 431 to the balcony slab 10 by bolts 432. The uniform lower profile yet remains unbroken, and the support structure integrated into the lower profile, such as the glazing profile area 310, whereto the glass or a corresponding cover plate structure 50 of the railing is fastened, remains intact.

[0039] When using at least two support posts, such as 43, according to the Applicant's discoveries a suitable span for the support posts is 1500 mm, and a bearing post is provided, aligned, within the area between the support posts, such as 43, in order to support the vertical load of the upper profile 31, such as the handrail. Such a support post may also be used next to a wall if the surface layer of the wall structure is made e.g. of insulating plaster or another material to which the upper profile of the railing, such as the handrail, cannot be fastened firmly.

[0040] The support post 43 is thus added e.g. to a 6000 mm long railing, instead of an ordinary post, i.e. a bearing post; the support post does not necessarily have to be positioned in the middle of the railing since it is quite discreet, particularly outwards, i.e. in the direction of outdoor air.

[0041] The support post 43 is firmly bolted at its bottom end to the balcony slab 10, and once the rest of the balcony structure has been brought to the horizontal, the support post 43 is adjusted by the height position adjustment arrangement 601 to 602, 701 to 702 to the final position in relation to the rest of the railing structure. The adjustment is provided in both the top and bottom ends of the support post 43 since all the rest of the railing structure is movable as a uniform entity in relation to the support post 43.

[0042] Some adjustment tolerance is necessary since usually the balcony slabs are not level but a deviation of up to 20 mm may occur. If a balcony slab 10 is slanting, it is not known in advance how much the balcony slab 10 is slanted where the support post 43 is at. Therefore, it is advantageous that the fastening of the support post 43 in relation to the rest of the railing structure, i.e. the lower profile 21, the upper profile 31 and the uniform entity formed by the bearing posts 41 to 42, 44 to 45 therebetween, is adjustable. It is impossible to know in ad-

vance the height position at which the railing is to be installed since for instance the railing of a neighbouring balcony may determine the installation height of the handrail, i.e. the upper profile 31, owing to a need for uniformity of appearance. The railings have to be installed in straight line in order for the railing lines of adjacent balconies to match and in order for the balcony glazing to settle in straight line, without diagonal gaps.

[0043] The bearing posts 41 to 42, 44 to 45, i.e. the ordinary posts, are provided with no adjustment; they are mounted between the handrail, i.e. the upper profile 31, and, on the other hand, the lower profile 21, by screw fastening, for instance. The entity formed by the upper profile 31, the lower profile 21 and the bearing posts 41 to 42, 44 to 45 is during the installation phase or service and repair phase movable as one entity in relation to the support post 43, enabled by the height position adjustment arrangements 601 to 602, 701 to 702. Standard-measure bearing posts 41 to 42, 44 to 45 may be used.

[0044] It is possible that a short railing may be provided with support posts 43 e.g. only at the ends of the railing, and no ordinary post, i.e. bearing post, at all. According to the Applicant's discoveries, it is reasonable to place support posts at as great span lengths as possible and, between them or around it/them, one to two ordinary post(s), i.e. bearing post(s), which may also be called light posts because a support post is more robust. The support post 43 may be made of extruded aluminium, steel, i.e. SST, or a composite.

[0045] It is apparent to a person skilled in the art that as technology advances, the basic idea of the invention may be implemented in many different ways. The invention and its embodiments are thus not restricted to the examples described above but may vary within the scope of the claims.

Claims

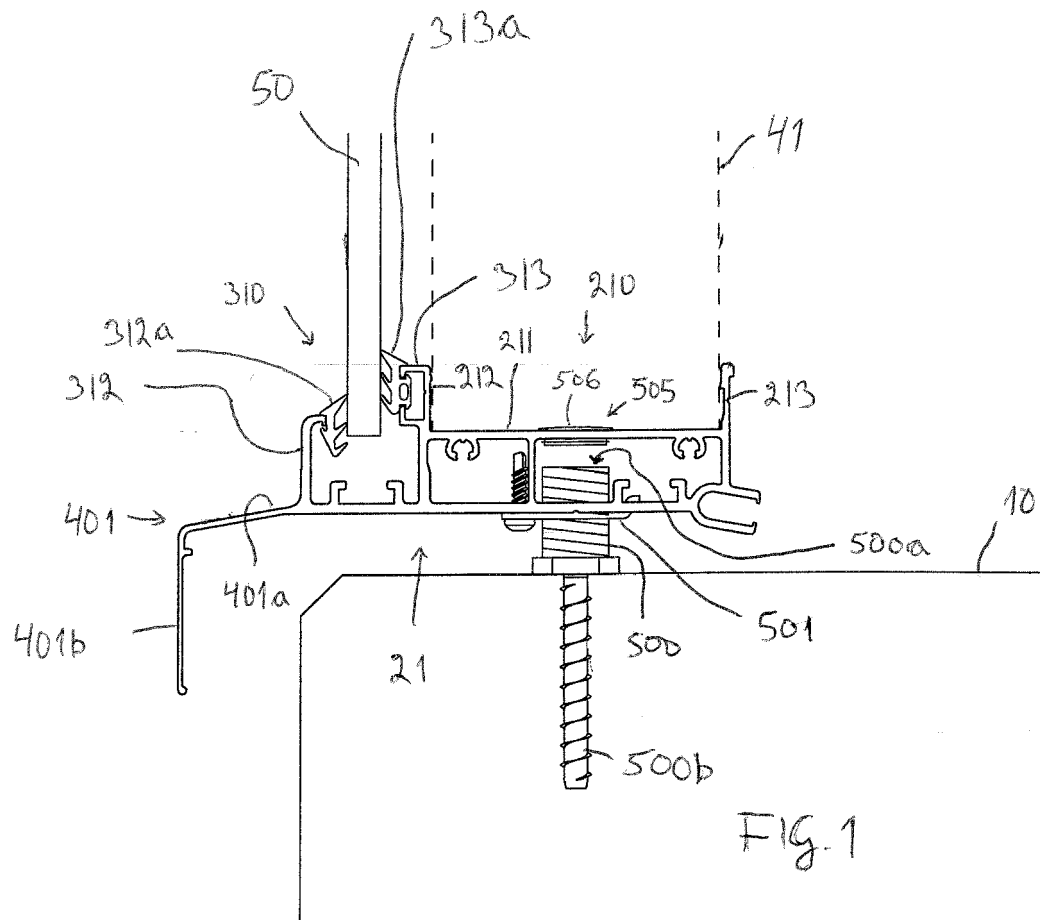
1. A balcony railing structure comprising a horizontal lower profile (21), a horizontal upper profile (31) and, further, a vertical post structure to connect the lower profile and the upper profile, **characterized in that** the post structure comprises a support post (43) penetrating through the lower profile via an indentation penetrating through the uniform lower profile, and that the railing structure comprises a fastening arrangement (431, 432) for fastening a bottom end of the support post to a balcony slab (10), and that the railing structure comprises a height position adjustment arrangement (60, 602) between the lower profile (21) and the support post (43) and a height position adjustment arrangement (431, 432) between the upper profile (31) and the support post (43).
2. A railing structure as claimed in claim 1, **characterized in that** in addition to the support post, the post structure comprises at least two vertical bearing

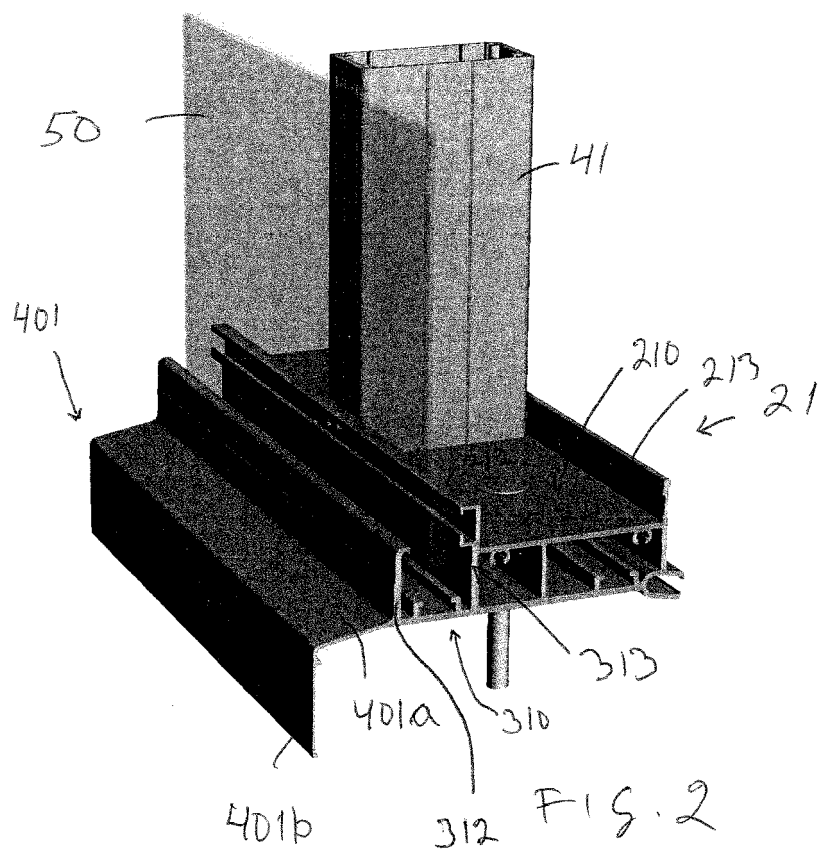
posts (41, 42, 44, 45) provided on the lower profile (21), below the upper profile (31), and fastened by fastening members (801, 802) to the lower profile and the upper profile to form a uniform entity from the lower profile, the bearing posts and the upper profile, the height position of the uniform entity being adjustable by the height position adjustment arrangement (601 to 602, 701 to 702) in relation to the support post (43) indented through the lower profile and fastenable by the fastening arrangement (431, 432) to the balcony slab (10).

3. A railing structure as claimed in claim 2, **characterized in that** the bearing posts (41 to 42, 44 to 45) and the support post (43) are placed such that the support post resides within an area between the bearing posts (42, 44).
4. A railing structure as claimed in claim 3, **characterized in that** the support post resides within the area between the bearing posts (42, 44) substantially at the midpoint.
5. A railing structure as claimed in claim 1, **characterized in that** a range of the support post (43) in a transverse direction of the railing structure is greater than a range of the bearing post (42, 44) in the transverse direction of the railing structure.
6. A railing structure as claimed in claim 5, **characterized in that** the range of the support post in the transverse direction of the railing structure is greater than the range of the bearing post in the transverse direction of the railing structure such that a rear edge of the support post, i.e. an edge facing the balcony in the support post, extends farther, i.e. more into the balcony area, than a rear edge of the bearing post.
7. A railing structure as claimed in claim 2, **characterized in that** a front edge, i.e. an edge facing outdoor air, of the support post is substantially aligned with front edges of the bearing posts.
8. A railing structure as claimed in claim 1, **characterized in that** a range of the upper profile in the transverse direction of the railing structure is greater than the range of the bearing post in the transverse direction of the railing structure.
9. A railing structure as claimed in claim 1, **characterized in that** the range of the upper profile in the transverse direction of the railing structure is at least as great as the range of the support post in the transverse direction of the railing structure.
10. A railing structure as claimed in claim 2, **characterized in that** the lower profile comprises an integral support structure (210, 211 to 213) extending in a

longitudinal direction of the lower profile for supporting one or more bearing posts on to the lower profile.

11. A railing structure as claimed in claims 2 and 10, **characterized in that** the bearing post (42, 43) is by means of a fastening member (801) fastened to the lower profile (21) via the support structure (210, 211 to 213) comprised by the lower profile.
12. A railing structure as claimed in claim 1, **characterized in that** the lower profile of the railing structure further comprises in the same profile an integral support structure (310, 312, 313) extending in the longitudinal direction of the lower profile for supporting a bottom part of a cover plate structure (50) of the balcony railing.
13. A railing structure as claimed in claims 10 and 12, **characterized in that** the support structure (210, 211 to 213) for supporting the bottom part of one or more bearing posts (41 to 42, 44 to 45) and the support structure (310, 312, 313) for supporting the bottom part of the cover plate structure (50) of the balcony railing, provided integrally in the lower profile, reside substantially parallel.
14. A railing structure as claimed in any one of the preceding claims, **characterized in that** the lower profile (21) and/or the upper profile (31) is/are an extruded aluminium profile(s).
15. A railing structure as claimed in claim 1, **characterized in that** in addition to the support post (43), the post structure comprises at least one vertical bearing post (45) provided on the lower profile (21), below the upper profile (31), fastened by fastening means (801, 802) to the lower profile and the upper profile to form a uniform entity from the lower profile, one or more bearing posts and the upper profile.





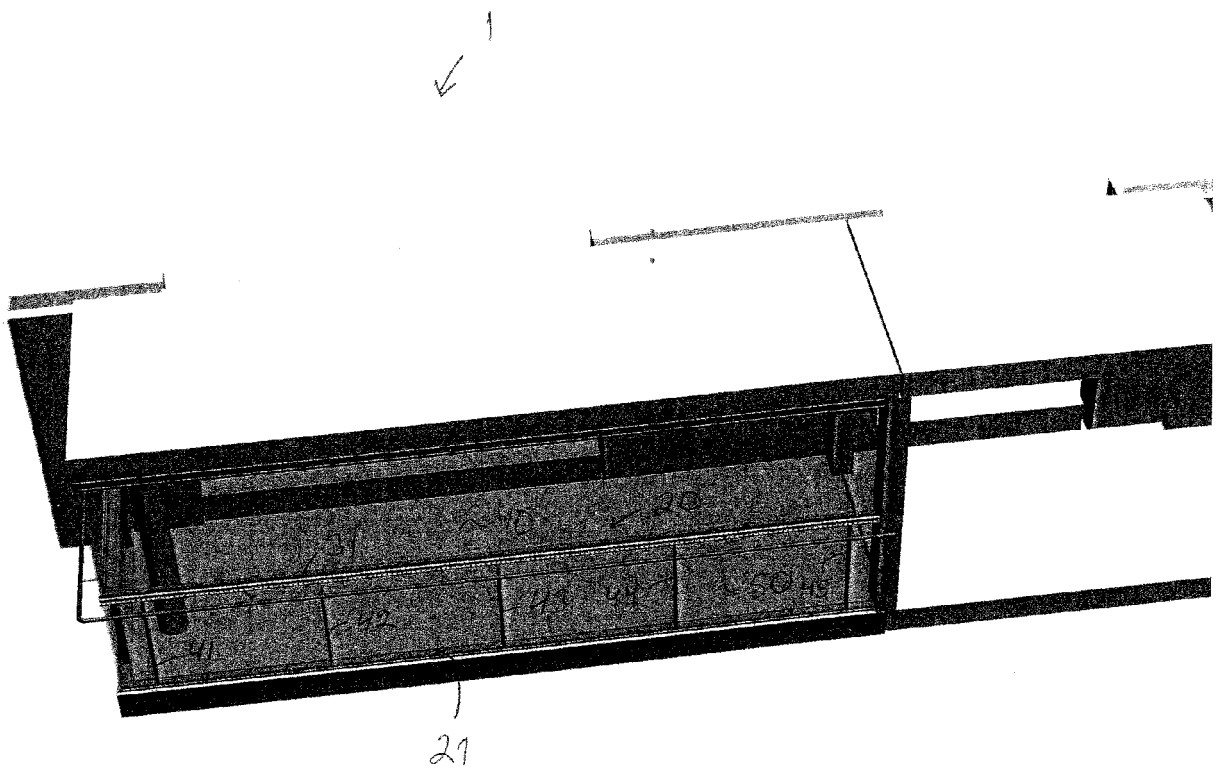
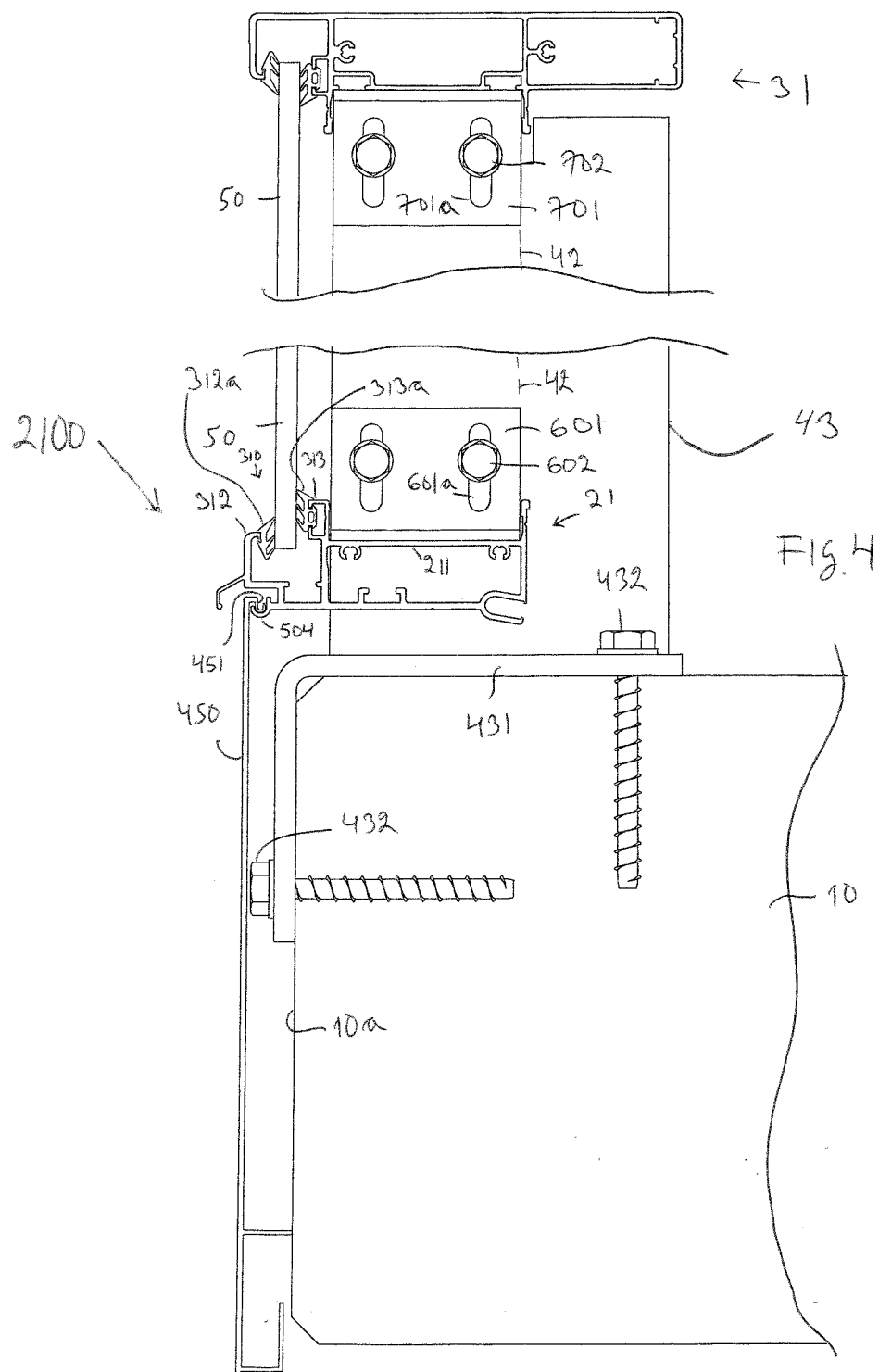
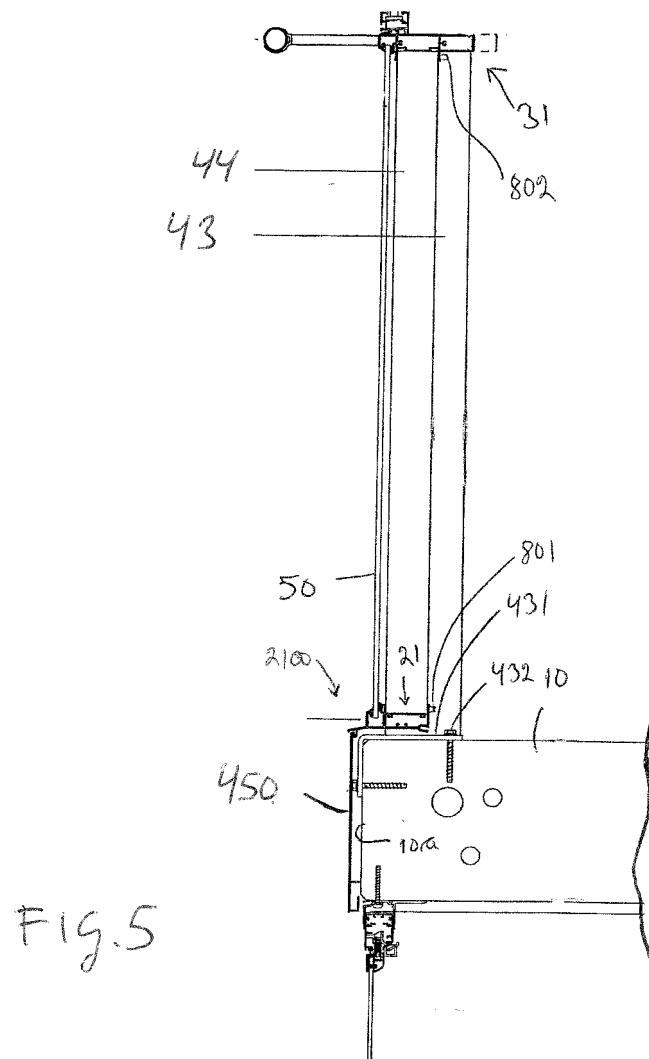


Fig. 3







EUROPEAN SEARCH REPORT

Application Number
EP 14 16 3024

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 2 300 869 A1 (FILDIER SA [FR]) 10 September 1976 (1976-09-10) * page 1, line 1 * * page 2, line 25 - line 27 * * page 3, line 38 - line 40 * * page 5, line 3 - line 5 * * figures 1,3 *	1-15	INV. E04F11/18
A	DE 20 2004 001781 U1 (KIENLE HOLZVERARBEITUNGS GMBH [DE]) 15 April 2004 (2004-04-15) * paragraph [0013] * * figure 1 *	1-15	
A	KR 2009 0128638 A (KIM WON IL [KR]) 16 December 2009 (2009-12-16) * figure 2 *	1-15	
A	WO 2009/098723 A2 (ERRETI SRL [IT]; AVVANZINI UGO [IT]) 13 August 2009 (2009-08-13) * figures 1,2 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) E04F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 June 2014	Examiner Arsac England, Sally
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 16 3024

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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12-06-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2300869 A1	10-09-1976	NONE	
DE 202004001781 U1	15-04-2004	NONE	
KR 20090128638 A	16-12-2009	NONE	
WO 2009098723 A2	13-08-2009	AT 513957 T	15-07-2011
		EP 2252748 A2	24-11-2010
		ES 2368377 T3	16-11-2011
		PT 2252748 E	30-09-2011
		WO 2009098723 A2	13-08-2009

EPO FORM P0459

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