

A wall module system

The invention relates to a wall module and a method for mounting such wall modules. Specifically, the invention relates to a wall module in accordance with the preamble of claim 1, having a first longitudinal connecting portion spaced from and parallel to a complementary second connecting portion, an intermediate portion connecting the two connecting portions to each other, the first and the second connecting portions being connectable to a second and a first connecting portion, respectively, of other wall modules for forming a wall assembly comprised by a plurality of joined wall modules, each wall module having a constant cross section. The invention also relates to a method for mounting such wall modules. In particular the wall module and the method of the invention are intended to be used in lifts.

In the past, bent and painted steel profiles were used, which were joined, e.g. for forming a wall in a lift cage. Thereby the manufacture of the steel profiles required many working moments, such as bending of edges and possibly also of the intermediate portion for dishing the same for providing rigidity and stability of the steel profile, boring for bolts, which are used when joining the steel profiles, and finally surface treatment, generally painting.

When joining the steel profiles, these are placed side by side, bolts then being inserted into bores made for this purpose in the profiles, whereupon nuts are threaded on the bolts for forming uniting bolt joints.

As known, the mounting of bolt joints is rather time-consuming and since the assembly of the profiles requires quite a number of such joints to be mounted in a satisfying manner, it should be realised that this work is a costly step in the manufacture of the lift cage. In spite of this, the joints do not function well. The junctions will often be untight and this in combination with the sheet material will result in a rather high noise level. When a joint filler is used in an attempt to improve the sealing and the noise absorption capacity, it will be found very difficult to apply and keep the filler in place, since this tends to fall out, generating gaps in the junctions.

A further important disadvantage in the use of bent and painted steel profiles is that they require a considerable maintenance, in particular in connection with lifts to be used in an outdoor environment, since the slightest scratch in the protecting paint layer immediately results in the start of a corrosive attack, which had to be stopped, e.g. by

blasting/grinding and re-paint.

In view of this, the object of the invention is to provide a wall module and a method by means of which the aforementioned disadvantages are avoided, i. e. in other terms to provide a wall module and a method of assembly, which require significantly less
5 numerous bolt joints than before, thereby allowing much quicker mounting than before, neither require bending nor painting steps, and which have improved noise performances and allow a joint filler to be applied and retained without falling out during mounting.

This object is solved by the features of the wall module and the method, respectively, of the invention, defined in the characterizing parts of claims 1 and 12, respectively.

10 Preferably, as defined in one of the subclaims, the wall module is an extruded aluminum profile, which provides for a simplified manufacture and a consummate rust protection.

The invention will now be described more in detail by means of a preferred embodiment with reference to the annexed drawings, wherein:

15

Fig 1 is a cross-section of a mounted lift cage portion, using one type of wall modules in accordance with the invention,

Fig 2 is a cross-section of another type of wall module in accordance with the invention, which may be used as a board for different equipment,

20

Fig 3 is a cross-section in a larger scale of a first connecting portion in the wall module of the invention,

Fig 4 is a cross-section in a larger scale of a second connecting portion in the wall modules of the invention, which is complementary to the first connecting portion .

25

Turning first to fig 1, which shows a corner of a lift cage wall, built up from joined wall modules 1, 1' of different widths. Each wall module 1, 1' is elongated and has a constant cross-section.

In one of the longitudinal sides of the wall module 1, 1' there is a first connecting
30 portion 3, formed like a tongue and in the other longitudinal side of the wall module 1, 1' there is a second longitudinal connecting portion 5, formed in a cross-section like a groove.

Between these complementary connecting portions 3, 5 an essentially flat wall

portion 7 extends, the flat portions of the wall portions being flush with each other, when mounted.

For a more detailed description of the connecting portions reference is now made to the views in a larger scale of figs 3 and 4. A longitudinal side of the flat wall portion 7 of the wall module 1' ends in a transversely extending abutment 9. In the vicinity thereof an arcuate tongue 11 originates from the back of the wall portion 7, which in this case has the form of a quarter of a ring with a rounded tip. Thus, the tip 13 of the tongue 11 is directed perpendicularly away from the flat wall portion 7. The other longitudinal side of the wall module 1' ends in an abutment 15, transverse to the flat wall portion 7, as well. The two abutments 9, 15 are designed for cooperation with each other in order to form the least possible clearance between two joined wall modules 1, 1' and simultaneously to provide a rotational limitation.

Of course, it should be understood, that the abutments 9, 15 must not be normal to the flat wall portion 7, but may be comprised by inclined complementary chamfers.

The second connecting portion 5 is complementary to the first one 3 in an extension 17 on the back of the wall portion 7, in the form of an arcuate groove 16, which in a cross-section has the form of a quarter of a ring. The width of the groove 16 is of course somewhat larger than that of the tongue 11 so that the latter may be inserted into the groove 16. The end of the groove 16 is, in the same manner as the tongue, directed perpendicularly to the wall portion 7. The extension 17 thereafter continues in an angled reinforcing rib 21 in order to give the wall module 1, 1' sufficient rigidity. This rib 21 may also serve as a coupling member at corner sections and the like.

In order to show the mounting of the modules 1, 1', again reference is made to fig. 1, in which below an unassembled wall module 1' is illustrated with dashed lines in its starting position. The unassembled module 1' is placed with its flat wall portion 7 generally transversely to the wall portion 7 of an assembled module, with the opening of the groove 16 situated on the protruding tip 13 of the tongue 11. The module 1' will then be rotated (upwardly in fig. 1) about the tongue 11, whereby it will penetrate deeper into the groove 16. The rotation will be stopped when the abutments 9, 15 engage each other or when the tip 13 of the tongue 11 reaches the bottom of the groove 16. The module 1' assembled at this moment may then be fixed by means of a suitable connection, in this case a bolt joint 22, which is threaded into the module 1' and into e.g. the downwardly bent roof portion of the lift cage (shown with a dashed line in fig 1).

Preferably, a joint filler is applied into the groove 16 before the joining of an adjacent module for providing tightness and noise reduction. By this measure the modules may also be given a certain degree of prestress.

In fig. 1 it also can be seen how a corner may be mounted. The corner member 25 is an angled profile having a second connecting portion provided with a groove, which is formed in the same manner as the connecting portion 5 of the described module 1'. This connecting portion 5 is assembled in the same way as the other connecting portions 5, i.e. on a tongue 11. The other leg 27 of the angled profile has the same form as the rib 21 and is joined to the reinforcing and connecting rib 21 of the next wall module 1' by means of bolt joints 29.

It should be realised that the portion between the connecting portions 3 and 5 of a wall module need not necessarily be flat. If a stepwise transition is desired, e.g. the connecting portions 3, 5 may be displaced in parallel in relation to each other and connected to each other by a steplike portion. The intermediate connecting portion may also be angle in correspondence to a desired corner angle of a corner of the space to be covered.

An additional wall module variant is illustrated in fig. 2. In this case the intermediate portion, which connects the connecting portions 3, 5, has a section in the form of an open rectangle having a long side and two short sides 33 and 35. Only two thin and flat wall sections 37 and 39, respectively, connect to the connecting portions 3, 5, which may be prolongations of the thicker adjacent wall portions 7. The illustrated structure is designed to comprise electric equipment and includes attachment means for this equipment. A similar structure for other equipment, e.g. fans and ventilation, is also possible.

The structure, shown in fig. 2, may in addition be used as an emergency ladder, i.e. if ladder pins are mounted in appropriate distances from each other between the walls 33 and 35, it may be utilized as a retracted emergency ladder in case of evacuation of the lift cage in an emergency situation. The structure may be used as a ladder in a shaft, as well.

It has not previously been mentioned, but all illustrated members are designed so that they may be extruded of aluminum without any problems. Thereby a lower weight in relation to steel sheet and an approximatively complete freedom of maintenance as regards corrosion is obtained, in addition to an improved noise level. Of course, the members of aluminum may undergo a conventional surface treatment, e.g. anodizing.

In spite of the slightly higher cost of material for aluminum, a significant cost reduction is achieved in comparison to steel sheet, as a result of the simplified and faster mounting. In fact, the profiles only have to be inserted into each other, be folded down and be anchored by a small number of bolt joints in relation to the many more connections used, when mounting profiles of steel sheet.

This Sheet Has Been Replaced

6



Claims

1. A wall module (1, 1') to be joined to other similar modules for forming a wall, in particular in a lift, comprising a first, longitudinally extending, connecting portion (3) spaced from a second, longitudinally extending, connecting portion (5), complementary to the first connecting portion (3) and an intermediate portion (7; 31, 33, 35), which connects said first and second connecting portions, said first and second connecting portions being connectable to second and first, respectively, connecting portions of other modules for forming a wall consisting of joined wall modules, said wall module having a constant section, characterized in that said first connecting portion (3) in section is formed like an arcuate tongue (11) and that the second connecting portion (5) in section is formed like an arcuate groove (16), being somewhat wider than said tongue for receiving the same, when joined.
2. A wall module as in claim 1, characterized in that said tongue (11) and said groove (16) in section are formed as parts of an annular ring.
3. A wall module as in claim 2, characterized in that said tongue (11) and said groove (16) extend about a quarter of a revolution.
4. A wall module as in any of claims 1-3, characterized in that each of the two connecting portions (3, 5) continues in a first flat wall portion (7; 37) and a second flat wall portion (7; 39), respectively.
5. A wall module as in claim 4, characterized in that the free ends of the tongue (11) and the groove (16), respectively, are perpendicular to their respective flat wall portions (7; 37, 39).
6. A wall module as in any of claims 4 or 5, characterized in that the generally flat wall portions (7; 37, 39) end in abutments at the tongue (11) and the groove (16), respectively, cooperating with corresponding abutments (15, 9) provided on cooperating wall modules for limiting the relative rotation of the wall modules (1, 1').
7. A wall module as in claim 6, characterized in that the abutments (9, 15) extend generally perpendicularly to their respective generally flat wall portions (7; 37, 39).
8. A wall module as in any of claims 1-7, characterized in that the generally flat first and second wall portions (7) are integral and forms a generally flat intermediate portion.
9. A wall module as in any of claims 1-7, characterized in that the intermediate portion (31, 33, 35) in section is formed as an open rectangle, this module forming a



board for electric equipment, control means or equipment for ventilation.

10. A wall module as in claim 9, **characterized in** that ladder pins are provided in the board, said board serving as an emergency ladder, e.g. in case of evacuation of a lift cage, or as a ladder in a shaft.

5 11. A wall module as in any of claims 1-10, **characterized in** that it is an extruded profile of aluminum.

12. A method of joining two wall modules (1, 1'), **characterized in** that each module (1, 1') comprises a first, longitudinally extending connecting portion (3) in section formed as an arcuate tongue (11) and a second, in parallel thereto, longitudinally
10 extending connecting portion (5), complementary to the first one and in section formed as an arcuate groove (16), and an intermediate portion (7; 31, 33, 35), which connects the two connecting portions (3, 5) to each other, that the groove (16) of the second connecting portion (5) is placed over the tongue (11) of the first connecting portion (3) and that the wall module comprising the groove (16) is rotated, so that the tongue (11)
15 penetrates into the groove (16) until a desired mutual position of the wall modules is reached.

13. A method as in claim 12, **characterized in** that a joint filler is applied into the groove (16) before assembly.

14. A method as in claim 12 or in claim 13, **characterized in** that the wall module to
20 be rotated is placed generally perpendicularly to the mounted wall module, the rotation then being carried out in such a manner that the two wall modules become parallel.



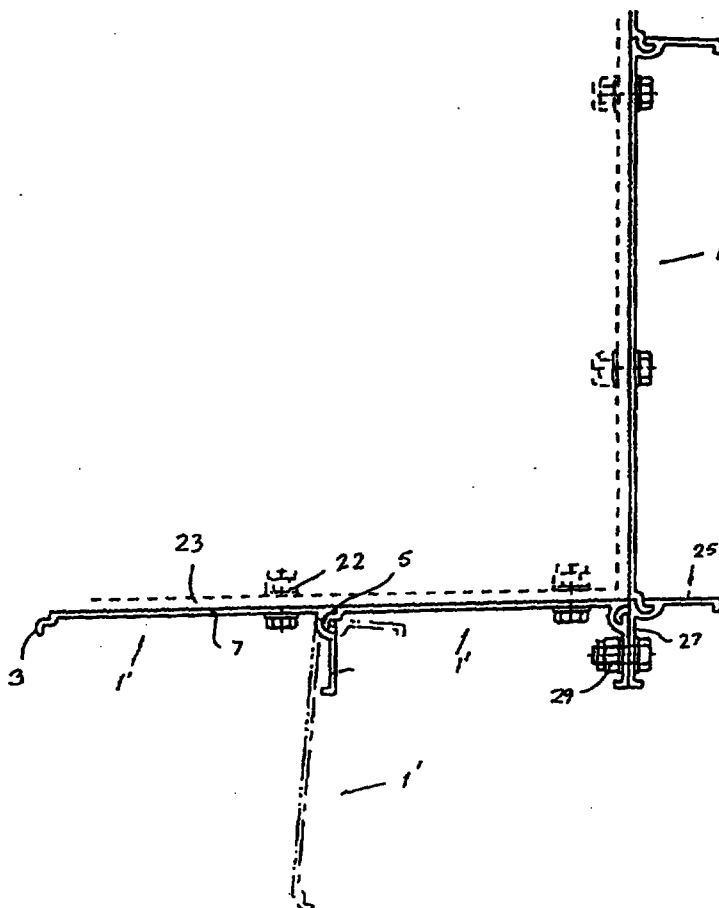


PCT

 WORLD INTELLECTUAL PROPERTY ORGANIZATION
 International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: E04C 2/08, E04B 1/61	A1	(11) International Publication Number: ✓WO 97/21008 (43) International Publication Date: 12 June 1997 (12.06.97)
(21) International Application Number: PCT/SE96/0159 ✓ (22) International Filing Date: 3 December 1996 (03.12.96) ✓ (30) Priority Data: 9504350-1 4 December 1995 (04.12.95) ✓ SE (71) Applicant (for all designated States except US): ALIMAK AB [SE/SE]; P.O. Box 720, S-931 27 Skellefteå (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): BACKMAN, Bo [SE/SE]; Kvällsgränd 12, S-931 52 Skellefteå (SE). (74) Agents: NILSSON, Jan et al.; Bergenstråhle & Lindvall AB, P.O. Box 17704, S-118 93 Stockholm (SE).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report. With amended claims. In English translation (filed in Swedish).
(54) Title: A WALL MODULE SYSTEM (57) Abstract A wall module (1') to be joined to other similar wall modules for forming larger wall assemblies is primarily intended to be used for the covering of lifts and lift shafts. The module has a first connecting portion (3) extending in parallel to a complementary second connecting portion (5). An intermediate portion (7) connects the connecting portions (3, 5) to each other. Thereby, the first coupling portion (3) has a cross section in the form of an arcuate tongue, the other one (5) having the form of an arcuate groove. Two wall modules (1') are joined by placing one wall module at an angle with an already mounted wall module (1'), the opening of said arcuate groove being placed over the tip of the tongue, the wall module to be mounted then being turned, so that the tongue penetrates into the groove until the desired position has been reached. Preferably, all members are manufactured from extruded aluminum.		





REPLACED

8

AMENDED CLAIMS

[received by the International Bureau on 28 April 1997 (28.04.97);
original claims 1-14 replaced by amended claims 1-12 (2 pages)]

1. A wall module (1, 1') to be joined to other similar modules for forming a wall, in particular in a lift, comprising a first, longitudinally extending, connecting portion (3), spaced from a second, longitudinally extending connecting portion (5), complementary to the first connecting portion (3) and an intermediate portion (7; 31, 33, 35), which connects said first and second connecting portions, said first and second connecting portions being connectable to second and first, respectively, connecting portions of other modules by rotating them for forming a wall, formed by joined wall modules, said wall module (1, 1') having a constant cross section, said first connecting portion (3) having a cross section in the form of an arcuate tongue (11), the second connecting portion (5) being formed in cross section as an arcuate groove (16), somewhat wider than said tongue for receiving the same, when joined, characterized in that said arcuate tongue (11) and said complementary arcuate groove (16) are convex towards said intermediate wall portion (7; 31, 33, 35), in that a first abutment (9, 15) is provided at the first connecting portion (3) and at one end of said wall portion and in that a second abutment (15, 9), complementary to the first abutment is provided at the second connecting portion (5), said abutments being designed so, that, when a wall module is rotated to be joined to an adjacent wall module, they will be brought into engagement with each other, thereby preventing further rotation of the wall modules in relation to each other, when their respective intermediate wall portions form a generally continuous continuation of each other, the assembled wall modules being dismountably connected.

2. A wall module as in claim 1, characterized in that said tongue (11) and said groove (16) in section are formed as parts of an annular ring.

3. A wall module as in claim 2, characterized in that said tongue (11) and said groove (16) extend about a quarter of a revolution.

4. A wall module as in any of claims 1- 3, characterized in that each of the two connecting portions (3, 5) continues in a first flat wall portion (7; 37) and a second flat wall portion (7; 39), respectively.

5. A wall module as in claim 4, characterized in that the free ends of the tongue (11) and the groove (16), respectively, are perpendicular to their respective flat wall portions (7; 37, 39).

6. A wall module as in any of claims 1-5, characterized in that the abutments (9, 15) extend generally perpendicular to their respective generally flat wall portions (7; 37, 39).



7. A wall module as in any of claims 1-6, **characterized in** that the intermediate portion (31, 33, 35) in section is formed as an open rectangle, this module forming a board for electric equipment, control means or equipment for ventilation.

8. A wall module as in claim 7, **characterized in** that the ladder pins are provided in the board, said board serving as an emergency ladder, e.g. in case of evacuation of a lift cage, or as a ladder in a shaft.

9. A wall module as in any of claims 1-8, **characterized in** that it is an extruded profile of aluminium.

10. A method of joining two wall modules (1, 1'), each module (1, 1') comprising a first, longitudinally extending connecting portion (3), in section formed as an arcuate tongue (11), and a second, in parallel thereto, longitudinally extending connecting portion (5), complementary to the first one, and in section formed as an arcuate groove (16), and an intermediate wall portion (7; 31, 33, 35), which connects the two connecting portions (3, 5) to each other, the groove (16) of the second connecting portion (5) being placed over the tongue (11) of the first connecting portion (3) of another module, and the wall module having the groove (16) placed over the tongue (11) being rotated so that the tongue (11) penetrates into the groove (16) until the desired mutual position between the two modules is reached, **characterized in** that the arcuate tongue (11) and the complementary arcuate groove (16) are convex towards the intermediate wall portion, in that a first abutment (9, 15) is provided at the first connecting portion (3) and at one end of said wall portion, in that a second abutment (15, 9), complementary to the first abutment, is provided at the second connecting portion (5), and in that a wall module to be joined is placed with the opening of the arcuate groove (16) over the tip of tongue (11) of a mounted wall module, the module to be joined being placed in an inclined position and then rotated, so that the tongue (11) penetrates into the groove (16) until the rotation is stopped by the engagement of the first and second abutments, the intermediate portions of the connected wall modules forming a substantially continuous prolongation of each other.

11. A method as in claim 10, **characterized in** that a joint filler is applied into the groove (16) before assembly.

12. A method as in claim 10 or claim 11, **characterized in** that the wall module to be rotated is placed generally perpendicularly to the mounted wall module, the rotation then being carried out in such a manner that the two wall modules become substantially parallel.

1/2

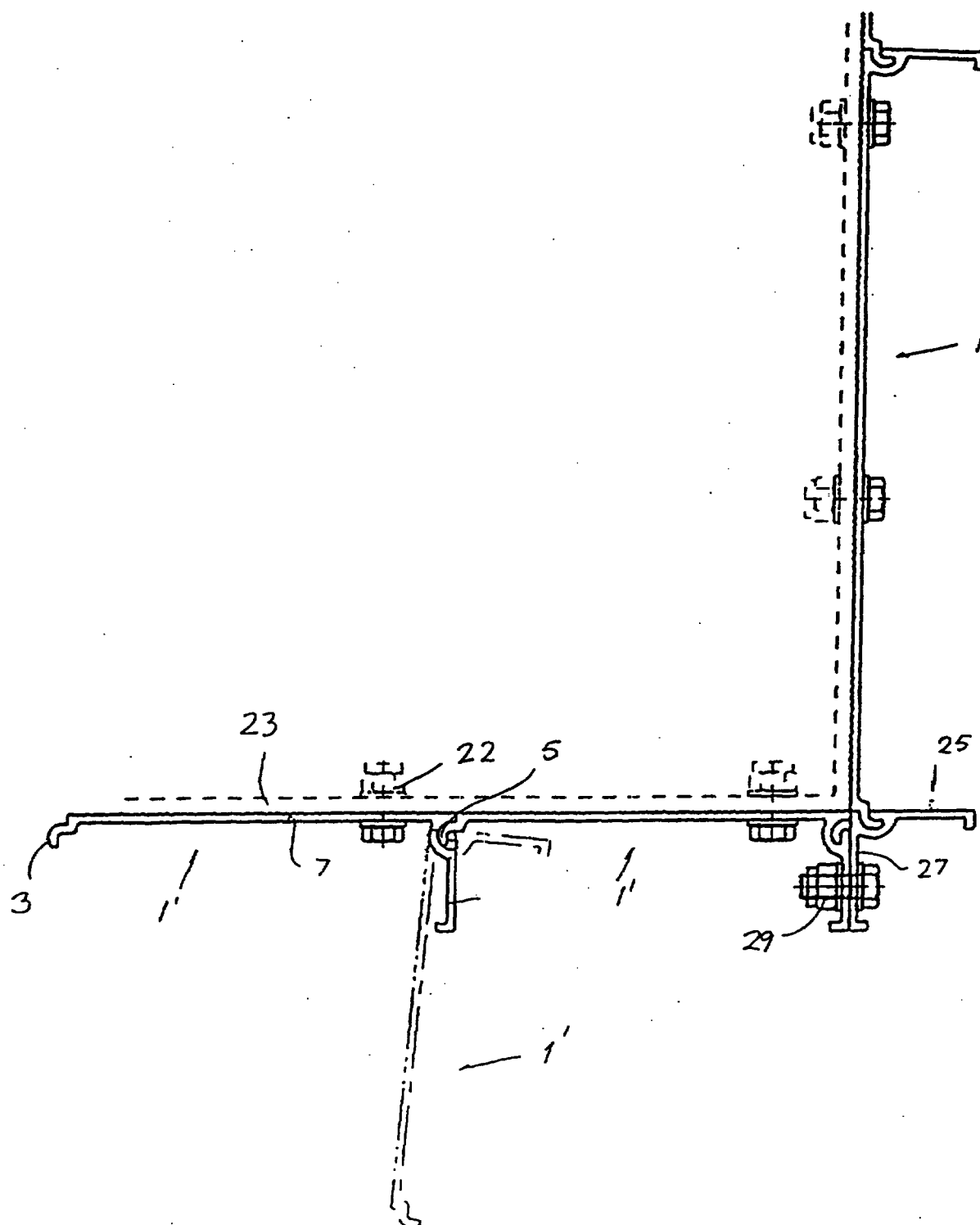


FIG. 1

SUBSTITUTE SHEET

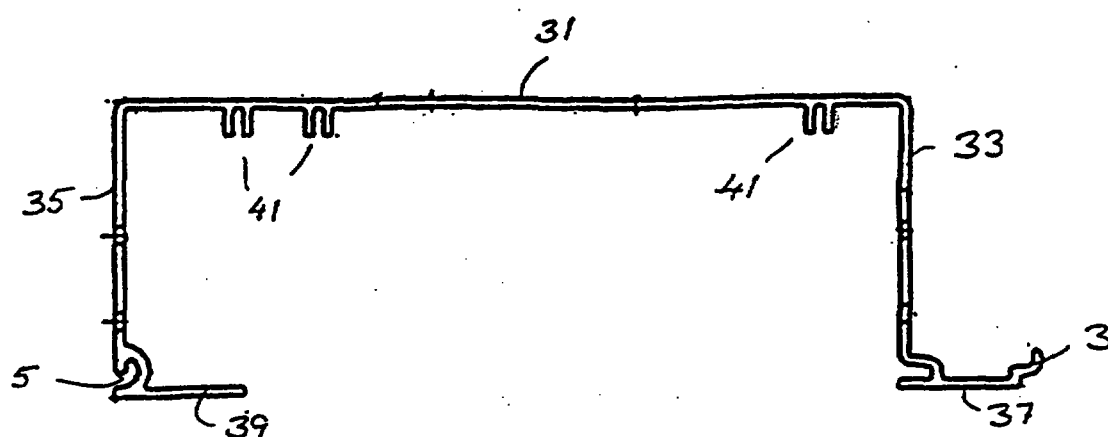


FIG. 2

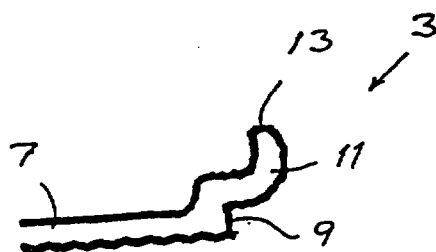


FIG. 3

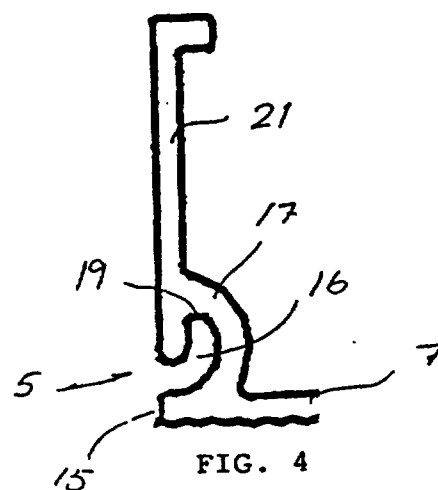


FIG. 4



75696/01571

6

2 8 APR 1937

Claims

1. A wall module (1, 1') to be joined to other similar modules for forming a wall, in particular in a lift, comprising a first, longitudinally extending, connecting portion (3), spaced from a second, longitudinally extending connecting portion (5), complementary to the first connecting portion (3) and an intermediate portion (7; 31, 33, 35), which connects said first and second connecting portions, said first and second connecting portions being connectable to second and first, respectively, connecting portions of other modules by rotating them for forming a wall, formed by joined wall modules, said wall module (1, 1') having a constant cross section, said first connecting portion (3) having a cross section in the form of an arcuate tongue (11), the second connecting portion (5) being formed in cross section as an arcuate groove (16), somewhat wider than said tongue for receiving the same, when joined, characterized in that said arcuate tongue (11) and said complementary arcuate groove (16) are convex towards said intermediate wall portion (7; 31, 33, 35), in that a first abutment (9, 15) is provided at the first connecting portion (3) and at one end of said wall portion and in that a second abutment (15, 9), complementary to the first abutment is provided at the second connecting portion (5), said abutments being designed so, that, when a wall module is rotated to be joined to an adjacent wall module, they will be brought into engagement with each other, thereby preventing further rotation of the wall modules in relation to each other, when their respective intermediate wall portions form a generally continuous continuation of each other, the assembled wall modules being dismountably connected.

2. A wall module as in claim 1, characterized in that said tongue (11) and said groove (16) in section are formed as parts of an annular ring.

3. A wall module as in claim 2, characterized in that said tongue (11) and said groove (16) extend about a quarter of a revolution.

4. A wall module as in any of claims 1- 3, characterized in that each of the two connecting portions (3, 5) continues in a first flat wall portion (7; 37) and a second flat wall portion (7; 39), respectively.

5. A wall module as in claim 4, characterized in that the free ends of the tongue (11) and the groove (16), respectively, are perpendicular to their respective flat wall portions (7; 37, 39).

6. A wall module as in any of claims 1-5, characterized in that the abutments (9, 15) extend generally perpendicular to their respective generally flat wall portions (7; 37, 39).



P-74 96/01591

2 8 APR 1997

7

7. A wall module as in any of claims 1-6, **characterized in** that the intermediate portion (31, 33, 35) in section is formed as an open rectangle, this module forming a board for electric equipment, control means or equipment for ventilation.

8. A wall module as in claim 7, **characterized in** that the ladder pins are provided in the board, said board serving as an emergency ladder, e.g. in case of evacuation of a lift cage, or as a ladder in a shaft.

9. A wall module as in any of claims 1-8, **characterized in** that it is an extruded profile of aluminium.

10. A method of joining two wall modules (1, 1'), each module (1, 1') comprising a first, longitudinally extending connecting portion (3), in section formed as an arcuate tongue (11), and a second, in parallel thereto, longitudinally extending connecting portion (5), complementary to the first one, and in section formed as an arcuate groove (16), and an intermediate wall portion (7; 31, 33, 35), which connects the two connecting portions (3, 5) to each other, the groove (16) of the second connecting portion (5) being placed over the tongue (11) of the first connecting portion (3) of another module, and the wall module having the groove (16) placed over the tongue (11) being rotated so that the tongue (11) penetrates into the groove (16) until the desired mutual position between the two modules is reached, **characterized in** that the arcuate tongue (11) and the complementary arcuate groove (16) are convex towards the intermediate wall portion, in that a first abutment (9, 15) is provided at the first connecting portion (3) and at one end of said wall portion, in that a second abutment (15, 9), complementary to the first abutment, is provided at the second connecting portion (5), and in that a wall module to be joined is placed with the opening of the arcuate groove (16) over the tip of tongue (11) of a mounted wall module, the module to be joined being placed in an inclined position and then rotated, so that the tongue (11) penetrates into the groove (16) until the rotation is stopped by the engagement of the first and second abutments, the intermediate portions of the connected wall modules forming a substantially continuous prolongation of each other.

11. A method as in claim 10, **characterized in** that a joint filler is applied into the groove (16) before assembly.

12. A method as in claim 10 or claim 11, **characterized in** that the wall module to be rotated is placed generally perpendicularly to the mounted wall module, the rotation then being carried out in such a manner that the two wall modules become substantially parallel.