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(71) Applicant: **J. Banks & Co. Limited**
Featherstone, Wolverhampton WV10 7HW (GB)

(72) Inventors:
- **Wellmann, David Anthony**
  Featherstone, Wolverhampton WV 10 7HW (GB)
- **Harrison, Peter James**
  Featherstone, Wolverhampton WV 10 7HW (GB)

(74) Representative: **Gee, Steven William**
D.W. & S.W. GEE
1 South Lynn Gardens
London Road
Shipston on Stour
Warwickshire CV36 4ER (GB)

(54) Guide rail and guide rail assembly for a folding/sliding door

(57) This invention relates to a guide rail for a folding/sliding door. The guide rail (10, 12) comprises a channel section adapted to accommodate a part of the carriage of the folding/sliding door, the guide rail including at least two alignment channels (20, 22), the alignment channels being adapted to accommodate an alignment member (24). The invention also relates to a guide rail assembly comprising at least two guide rails and at least two alignment members, the guide rails being interconnected and aligned by the alignment members.

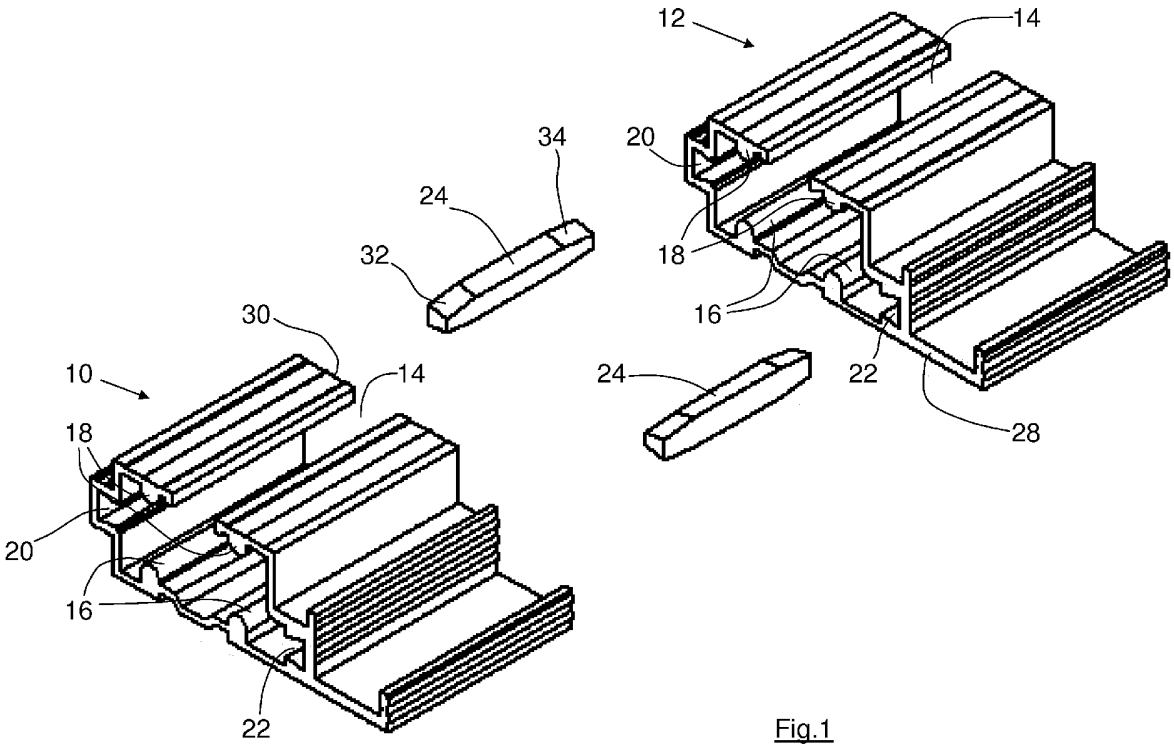

Fig.1

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a guide rail and to a guide rail assembly for a folding/sliding door.

[0002] Directional and orientational terms used in this specification, such as "top", "bottom", etc., are used to describe the guide rail and components in their normal orientation of use.

BACKGROUND TO THE INVENTION

[0003] Folding/sliding doors are a particular type of door for closing an opening in the wall of a building. A folding/sliding door will often be used as an alternative to a patio door for example, and is distinguished in that the door panels fold together in concertina fashion when the door is opened, rather than one door panel sliding over (and parallel to) a fixed door panel as occurs with a typical patio door.

[0004] Typically the door panels will be of a height to span the distance between the top and bottom of the opening, so that the folding/sliding door comprises the required number of panels arranged side by side to span the width of the opening.

[0005] Each of the door panels typically comprises a substantially rigid frame surrounding a glazing panel. Respective sets of hinges connect adjacent panels together. Alternate hinges are mounted upon a respective carriage, the carriage being located in one of two guide rails, the guide rails being mounted at the top and bottom of the opening. The hinges which are mounted upon carriages are "captive" in that they are located by the guide rails and are restricted to movement along the guide rails.

[0006] The intermediate hinges, i.e. those hinges which are not mounted upon a carriage, are free to move out of alignment with the guide rails when the door is opened. This alternating arrangement of "captive" and "free" hinges allows the door panels to open in a concertina fashion.

[0007] Folding/sliding doors have the particular advantage that they maximise the size of the opening which is available for ventilation or access. A patio door, for example, will typically comprise one fixed panel and one sliding panel. Since only the sliding panel is movable a fully-opened patio door can provide slightly less than half of the opening for ventilation or access. A folding/sliding door on the other hand can usually provide almost all of the opening for ventilation or access.

[0008] Accordingly, folding/sliding doors are particularly beneficial for buildings containing private swimming pools for example, and also for restaurants having indoor and outdoor areas which can be separated when desired by closing the folding/sliding door, or combined into substantially a single area when the door is opened.

[0009] Because of the almost complete opening of the folding/sliding door, certain of the carriages can move along almost the full length of the guide rails during the opening and closing movement. The guide rails are therefore typically made as one-piece extrusions or channel sections, so as to avoid discontinuities or junctions which might hinder the passage of a carriage.

[0010] Some folding/sliding doors are, however, several metres wide (folding/sliding doors having a width of 7 metres are not unusual). It is very difficult to ensure that a guide rail of such a length will reach the site of use without damage or distortion which will at least hinder the passage of the carriage and therefore increase the force required to open and/or close the door, and at most make the guide rail unusable.

[0011] Whilst it would be possible to provide purpose-built containers in order to minimise the likelihood of the guide rails being damaged during transportation, that is unlikely to be commercially viable since often only two guide rails will need to be transported to a particular site.

SUMMARY OF THE INVENTION

[0012] The inventors have appreciated the fact that the need to replace a damaged guide rail will reduce (or in some cases avoid) the profit which an installer might otherwise make when installing a folding/sliding door. The inventors wish to reduce the high failure rate in the existing guide rails, caused by the frequent incidences of damaged or distorted guide rails. The inventors therefore seek to reduce the likelihood of the installers being required to replace a guide rail and therefore increasing the likelihood that the installer will achieve the intended profit.

[0013] According to the invention there is provided a guide rail for a folding/sliding door, the guide rail comprising a channel section adapted to accommodate the carriage(s) of the folding/sliding door, the guide rail including at least two alignment channels, the alignment channels being adapted to accommodate an alignment member.

[0014] The invention therefore provides a guide rail which is designed to accommodate at least two alignment members. The alignment members are used to align adjacent lengths of the guide rail, whereby the guide rail for a folding/sliding door can be made in relatively short lengths, and in particular lengths which are more easily transported to and around a site of use, and are less vulnerable to damage or distortion.

[0015] The provision of two alignment members helps to ensure that when adjacent lengths of guide rail are interconnected they are aligned sufficiently accurately so that the carriage can pass along the complete guide rail, and in particular can pass the junction between one length of guide rail to a neighbouring length of guide rail, without significant hindrance.

[0016] Preferably, the guide rail includes a pair of guide ribs, the guide ribs being positioned to accommodate the wheels or rollers of the carriage. Preferably also, the pair

of guide ribs are located between the alignment channels. In guide rails having guide ribs, it is the guide ribs of adjacent lengths of guide rail which must be aligned, and more accurate alignment of the guide ribs is achieved by locating the alignment channels outside of the guide ribs (so that the alignment channels "surround" the guide ribs).

[0017] Desirably, the guide rail includes four guide ribs, arranged in two pairs. A first pair of guide ribs is provided for use when the guide rail is located at the bottom of the opening (so that the carriage rests upon the first pair of guide ribs). A second pair of guide ribs is provided for use when the guide rail is located at the top of the opening (so that the carriage is suspended from the second pair of guide rails). In this way, a guide rail of the same form (such as a common extrusion) can be used at the top and bottom of the opening.

[0018] There is also provided a guide rail assembly for a folding/sliding door, the guide rail assembly including at least two guide rails of similar cross-sectional form, each guide rail comprising a channel section adapted to accommodate the carriage(s) of the folding/sliding door, each guide rail including at least two alignment channels, the assembly including at least two alignment members adapted to fit into the alignment channels of the respective guide rails whereby to align the guide rails.

[0019] Preferably, the alignment channels are of dovetail form. Preferably also the alignment members are a tight fit into the alignment channels so that it is necessary to drive each alignment member into an alignment channel.

[0020] Desirably, the alignment member includes a positioning rib, the positioning rib preferably being located substantially at its longitudinal centre, the positioning rib serving to limit the distance by which the alignment member is driven into the alignment channel. In this way, it can be ensured that an approximately equal length of the alignment member is located in the alignment channels of the adjacent guide rails.

[0021] Preferably the guide rail is an aluminium extrusion, and is cut to manageable lengths at the location where it is extruded. A manageable length will typically be 3 metres, for example, it being understood that a guide rail of this length does not usually need a special vehicle, or special measures to be taken, for transportation to the site of use, the guide rail being more easily transported, and more easily handled on site, whereby to reduce the likelihood of damage.

[0022] It will be understood that damage can still occur to guide rails of shorter length (e.g. 3 metres) during handling and transportation, but in such cases the cost to the installer of a replacement length of guide rail will be much less, and the cost of transporting the replacement guide rail to the site of use will be much less, thereby significantly reducing the likelihood that the installer will lose some or all of the profit on a particular installation even if a guide rail should become damaged.

[0023] The present invention therefore provides no immediate benefit to the customer (i.e. the end user of the folding/sliding door), and the customer should ideally not be aware that the guide rail assembly comprises a multiple-piece construction rather than one-piece construction. However, the present invention does provide significant benefits for the installer. The invention can nevertheless provide long-term benefit to the customer in the event that a guide rail become damaged during subsequent use. If damage during use does occur it should be necessary to replace only the damaged guide rail and not also the other guide rail(s) in the assembly.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] The invention will now be described in more detail, by way of example, with reference to the accompanying Fig.1 which shows a perspective view of the ends of two guide rails according to the present invention, with two alignment members ready to be driven into their respective alignment channels

DETAILED DESCRIPTION

[0025] The guide rails 10, 12 are of identical form (i.e. they are identical in cross-section). Only the ends of the guide rails 10 and 12 are shown (as the invention relates only to the connection of those ends), but it will be understood that each guide rail 10, 12 can be of substantial length, for example 3 metres.

[0026] In known fashion, the guide rails 10, 12 each comprise a channel section, with an opening 14. The opening 14 is sized to accommodate a part of a carriage (not shown), and in particular the part of the carriage which connects to a captive hinge (also not shown) of the folding/sliding door.

[0027] In Fig.1 the opening 14 is at the top of the guide rails, so that the guide rails 10,12 are oriented as required for fitting to the bottom of an opening (not shown) in the wall of a building. It will be understood that guide rails of identical form could be used at the top of the opening, with the opening 14 at the bottom of the guide rail, whereby to suspend the captive hinge(s) from the guide rails.

[0028] The guide rails 10, 12 each have two pairs of guide ribs 16, 18. It will be understood that the carriage has a set of wheels or rollers which almost completely span the distance between the pairs of ribs, i.e. one wheel or roller lies between the left-hand rib 16 (as drawn) and the left-hand rib 18 and another wheel or roller lies between the right-hand rib 16 and the right-hand rib 18.

[0029] The pair of guide ribs 16 support the wheels or rollers, and thereby support the carriage, in the guide rails such as 10 and 12 at the bottom of the opening, whereas the pair of guide ribs 18 support the wheels or rollers of the carriage in the corresponding guide rails at the top of the opening.

[0030] It will be understood that the number of guide ribs 16 and 18 are chosen to correspond to the design

of the carriage of the folding/sliding door. Alternative designs of carriage, and correspondingly the alternative designs of guide rails for those carriages, can have a single guide rib 16 and 18, or more than two guide ribs. Another alternative design can include only the guide rib(s) 16 or the guide rib(s) 18, and yet another alternative design can have no guide ribs.

[0031] According to the present invention the guide rails 10, 12 also include two alignment channels 20, 22 which are of a size and shape to accommodate a respective alignment member 24. In this embodiment the two alignment channels 20, 22 and also the two alignment members 24, are identical, but that need not be the case. Also, whilst the guide rails 10, 12 have two alignment channels 20, 22, more alignment channels can be provided if desired.

[0032] The alignment members 24 are also of dovetail form, and are sized to be a tight fit into the alignment channels 20, 22. It is therefore necessary to drive each alignment member 24 into its respective alignment channel, such as by a hammer. Specifically, the two alignment members 24 can be driven into the alignment channels 20 and 22 of the guide rail 10 (or 12), and then the other guide rail 12 (or 10) can be driven thereonto by impacting the opposed end of that guide rail.

[0033] Though not shown in the drawing, the alignment members 24 preferably have a positioning rib, or a positioning projection, at or close to their longitudinal centre, the positioning rib or projection being too large to be driven into the alignment channel 20,22. The positioning rib or projection can therefore ensure that approximately half of the alignment member is located in the guide rail 10, and approximately half is located in the guide rail 12, in the assembled condition. Notwithstanding the presence of a positioning rib or projection, however, when assembled together it is arranged that the end 28 of the guide rail 12 abuts the end 30 of the guide rail 10, so that there is substantially no gap therebetween for the carriage to pass. The adjacent ends 28, 30 can be allowed to abut by including a recess in the end 28 and/or 30 to accommodate the positioning rib.

[0034] The alignment channels 20, 22 and the alignment members 24 are of dovetail form so that the alignment channels can be open to the centre of the respective guide rail as shown. This avoids the requirement to make the alignment channels as closed channels (box sections), and thereby makes the guide rails 10, 12 easier to make as an extrusion.

[0035] The alignment members 24 have tapered ends 32, 34, to facilitate their insertion into the alignment channels 20, 22. In alternative embodiments the alignment channels additionally or alternatively have flared ends for the same purpose.

[0036] By placing the alignment channels 20, 22 farther apart than the guide ribs 16 and 18, any misalignment of the guide ribs 16, 18 will be less than the misalignment of the alignment channels 20, 22. Since the alignment members can ensure almost perfect alignment of the guide rails 10 and 12, the guide ribs 16, 18 will also be substantially perfectly aligned, so that the passage of the carriage from one guide rail 10 to an adjacent guide rail 12 is imperceptible in practice.

[0037] Thus, in the preferred embodiment shown in which the guide rails 10, 12 have two guide ribs 16 and two guide ribs 18, one of the guide ribs 16 and one of the guide ribs 18, is located to either side of the opening 14, and one of the alignment channels 20, 22 is located to either side of the four guide ribs. Alternatively stated, when viewed from the end of a guide rail 10,12, from left to right, there is located the alignment channel 20, then a guide rail pair 16, 18, then the opening 14, then the other guide rail pair 16, 18, then the other alignment channel 22.

[0038] Whilst the guide rails of the invention are ideally suited to use with folding/sliding doors, similar guide rails may be used in other applications, such as for sliding patio doors for example.

Claims

1. A guide rail (10, 12) for a folding/sliding door, the guide rail comprising a channel section adapted to accommodate a part of the carriage of the folding/sliding door, the guide rail including at least two alignment channels (20, 22), the alignment channels being adapted to accommodate an alignment member (24).

2. A guide rail (10, 12) according to claim 1 having an opening (40) for a part of the carriage, the opening being located between the alignment channels (20, 22).

3. A guide rail (10, 12) according to claim 1 having at least one guide rib (16, 18) to accommodate wheels or rollers of the carriage.

4. A guide rail (10, 12) according to claim 3 in which the or each guide rib (16, 18) is located between the alignment channels (20, 22).

5. A guide rail (10, 12) according to claim 3 or claim 4 having four guide ribs (16, 18), arranged in two pairs.

6. A guide rail (10, 12) according to any one of claims 1-5 comprising an aluminium extrusion.

7. A guide rail (10, 12) according to any one of claims 1-5 having a length of 3 metres or less.

8. A guide rail (10, 12) according to any one of claims 1-7 in which the alignment channels (20, 22) are open to the channel section.

9. A guide rail (10, 12) according to claim 8 in which

the alignment channels (20, 22) are of dovetail form.

10. A guide rail (10, 12) according to any one of claims 1-9 in which the two alignment channels (20, 22) are of identical cross-sectional size and shape.

11. A guide rail assembly for a folding/sliding door, the guide rail assembly including at least two guide rails (10, 12) of similar cross-sectional form, each guide rail comprising a channel section adapted to accommodate a part of the carriage of the folding/sliding door, each guide rail including at least two alignment channels (20, 22), the assembly including at least two alignment members (24) adapted to fit into the alignment channels of the respective guide rails whereby to align the guide rails (10, 12).

12. A guide rail assembly according to claim 11 in which the alignment members (24) are each a tight fit into the respective alignment channel (20, 22).

13. A guide rail assembly according to claim 11 or claim 12 in which the alignment members (24) each include a positioning rib.

14. A guide rail assembly according to claim 13 in which the positioning rib is located substantially at the longitudinal centre of the alignment member (24), the positioning rib serving to limit the distance by which the alignment member can be driven into an alignment channel (20, 22).

15. A guide rail assembly according to claim 13 or claim 14 having a recess adjacent to the alignment channels (20, 22), the recess being adapted to accommodate the positioning rib whereby the positioning rib does not prevent the abutment of the ends (28, 30) of adjacent guide rails.

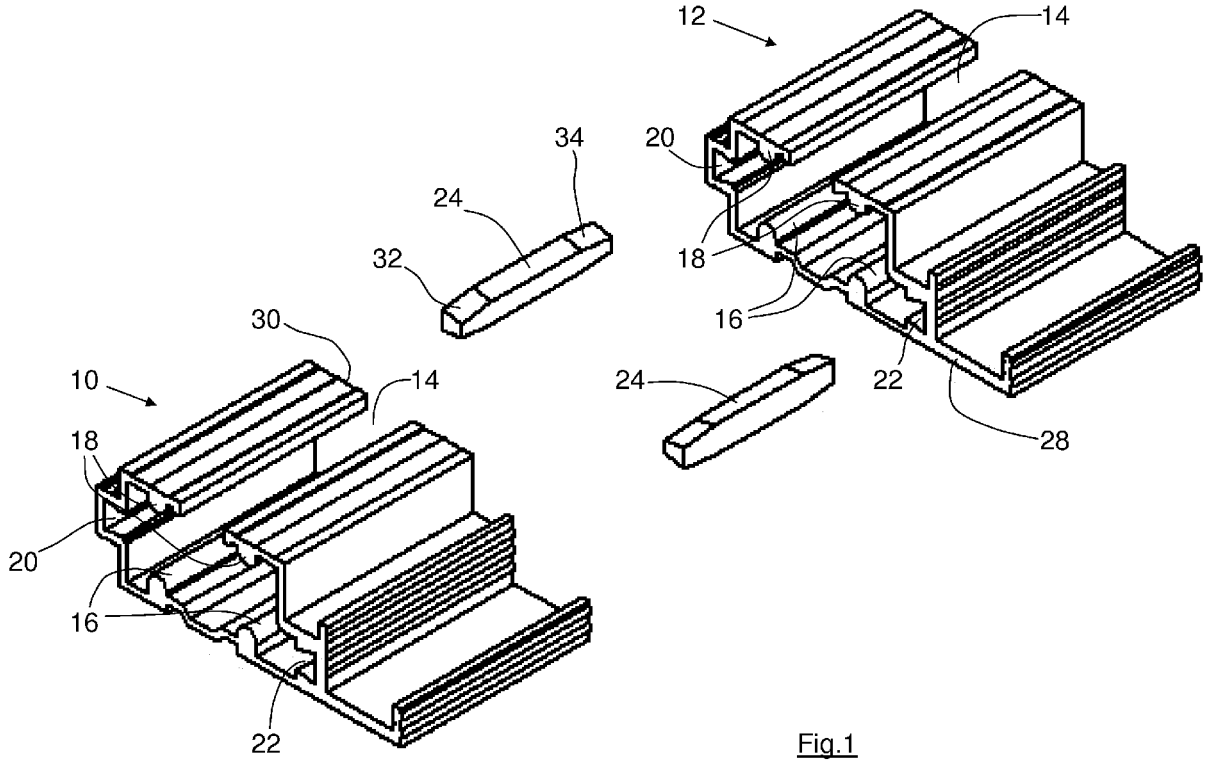

Fig.1