A mechanism for the adjustment of the vertical alignment of a panel member contained within an elongated channel section comprising: one or more means of clamping the panel member with an adjustable force; and one or more support means for supporting the panel member within the channel section; wherein the one or more means of clamping the panel member is arranged to adjustably tilt and secure the panel member so as to be maintained substantially vertically aligned even when the elongated channel section is secured to a surface which is not substantially horizontal.
FIELD OF THE INVENTION

The present invention relates to a panel support and adjustment mechanism. In particular but not exclusively the invention relates to a panel support and adjustment mechanism for glass balustrades, partitioning, glass staircases and safety barriers.

BACKGROUND

It is known to support panel members for use in a balustrade system in an elongated channel section that is bolted to the floor or any other suitable structure. The glass balustrade panel is inserted into the channel section and retained in position by the use of casting with a setting resin, clamping with bolts or with the use of wedges.

All of these methods have disadvantages. Casting in place with a setting resin has the disadvantage of making it difficult to move or replace the glass in the event of damage either during installation or during the subsequent lifetime of the balustrade. Additionally it takes a while for the resin to set and during this time the member must be supported by an additional means. Clamping with bolts or wedges requires the channel section to be bolted to the supporting structure with absolute alignment accuracy. This is to ensure that the glass balustrade is substantially vertical. Very small angular errors in the vertical alignment of the channel section as a result of an uneven floor surface or supporting structure can result in large displacements at the top of the balustrade.

It is an aim of embodiments of the present invention to at least partially mitigate the disadvantages of known panel member support and alignment methods.

STATEMENT OF THE INVENTION

In a first aspect of the invention there is provided a mechanism for the adjustment of the vertical alignment of a panel member contained within an elongated channel section comprising;

one or more means of clamping the panel member with an adjustable force; and
one or more support means for supporting the panel member within the channel section;
wherein the one or more means of clamping the panel member is arranged to adjustably tilt and secure the panel member so as to be maintained substantially vertically aligned even when the elongated channel section is secured to a surface which is not substantially horizontal.

Embodiments of the invention have the advantage that they provide a means to adjust the vertical alignment of the panel member, regardless of the orientation of the channel section to the supporting structure.

Embodiments of the invention have the additional advantage that the panel member can be removed or replaced at any time with the use of a simple tool.

Embodiments of the invention have a yet further advantage that they can also accommodate panel members comprising a range of different thicknesses.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described with reference to the accompanying figures in which:

FIGURE 1 is a cross section of the mechanism and channel section with a panel member secured in place.

FIGURE 2 is cross section showing the angular displacement of the panel member possible by the adjustment of the bolts applying the clamping force.

FIGURE 3 is an exploded perspective view of the various components of the system.

FIGURE 4 is a perspective view of a section of channel support showing the panel member with clamping support plate in position.

FIGURE 5 is a perspective view of a section of clamping support plate with a clamping force generating component in place.
FIGURE 6 is a cross section of a second embodiment showing an alternative arrangement of extrusions with a panel clamped in place.

FIGURE 7 is a cross section showing the angular displacement of the panel member possible by the adjustment of the second embodiment of the panel member clamping arrangement.

FIGURE 8 is a perspective view of a section of channel support showing the panel member with clamping support plates of the second embodiment in position. Tightening the nuts generates the required clamping force.

FIGURE 9 is an exploded perspective view of the various components of the second embodiment.

FIGURE 10 is a perspective view of a section of the clamping support plate with a threaded rod in place.

DETAILED DESCRIPTION

In a first embodiment of the present invention Fig.1 shows a schematic drawing of a channel extrusion profile 2 with a glass panel 1 in place.

A support plate 3 is attached to each side of the glass or panel. This support plate 3 can be of varying thickness to accommodate glass or panels of a range of different thicknesses.

The assembly of the glass or panel member 1, and support plate 3 is placed into the channel section extrusion 2 where it wedges into the substantially V shaped profile at the base of the channel section extrusion. It is to be understood that this locates the lower edge of the glass or panel assembly and also centres the glass or panel in the channel extrusion 2.
Two threaded clamping extrusions comprising of parts 4, with threaded fasteners 5 are placed on each side of the glass or panel member assembly and are also located in grooves running along each side of channel extrusion 2.

It is to be understood that the invention would also function without the requirement of the use of locating grooves.

As the fasteners 5 are wound out of clamping extrusion 4 they create a wedging action against the angled ramps 6 of the support plate profiles 3. This opposing wedging action clamps the glass or panel member in position in the channel extrusion 2. By adjusting the fasteners 5 each side of the glass or panel assembly, the glass or panel member can be set at a range of angles relative to channel section extrusion 2.

Due to the angle of the ramps 6 on the side of support plate 3, this side clamping force also generates a downward component 9 that forces the glass or panel assembly into the substantially V shaped profile 8 at the base of channel section extrusion 2. This clamps the lower edge of the glass or panel member assembly at the same time.

The clamping extrusions 4 with fasteners 5 will self align with support plate 3, depending on the angle the glass or panel member assembly has been positioned.

Fig. 2 shows a schematic drawing of the angular movement possible by adjusting the fasteners 5 on each side of the glass or panel member 1 and support plate 3 assembly.

Once the glass panel 1 is adjusted to the position required, fasteners both sides are tightened equally to generate the full clamping force required to keep the glass panel 1 in position.

This clamping force also generates the downward component that wedges the lower edge of the glass or panel member assembly into the V shaped profile 11 of the channel section extrusion 2.

Clamping extrusion 4 with fasteners 5 will self align in the radius groove 10 of channel section extrusion 2 depending on the angle glass or panel member 1 is clamped.

Fig. 3 shows a perspective exploded view of a section of the various components of the system. Shown is clamping extrusion 4 with tapped holes positioned at intervals along the
section. Threaded fasteners are inserted into these tapped holes and when wound out of the extrusion 4, generate the adjustment and clamping force required on the glass or panel member 1 and support plate 3 assembly.

**Fig. 4** shows a perspective view of the various components of the system. Glass or panel member 1 channel section extrusion 2 and support plate 3.

**Fig. 5** shows a perspective view of a section of clamping extrusion 4 showing fasteners 5 in position.

In an alternative embodiment of the invention, the clamping force is generated by the use of expanding wedges instead of threaded fasteners.

The core principal of the invention, generating a downward component from the side clamping force, by having the clamping force from each side of the panel angled down towards the panel centre, is retained. This downward component wedges the panel assembly into the substantially V shaped profile in the base of the channel section, this results in a clamping force being generated over the full depth of the panel assembly retained in the channel section.

**Detailed description of an alternative embodiment:**

**Fig. 6** shows a schematic drawing of a channel extrusion profile 12 with a glass or panel member 1 in place.

A support plate extrusion 13 is attached to each side of the glass or panel member. This support plate extrusion 13 can be of varying thickness to accommodate glass or panels of a range of different thicknesses.

The assembly of glass or panel member 1, and support extrusion extrusions 13, is placed into the channel section extrusion 12, where it wedges into the substantially V shaped profile at the base of the channel section extrusion. This locates and clamps the lower edge of the glass or panel member assembly and also centres the glass or panel member in the channel section extrusion 12. Two assemblies of expanding wedges 16 are placed in angled grooves in support plate extrusions 13 on each side of the glass or panel member.
assembly. As the wedges expand they press against the sides of channel extrusion 12 and support plate extrusions 13. This opposing wedging action clamps the glass or panel member in position in the channel extrusion 12. By adjusting the wedges 16, each side of the glass or panel member assembly, the glass or panel member can be set at a range of angles relative to channel section extrusion 12. The angled clamping force also generates the downward component that clamps the lower edge of the glass or panel member in the substantially V shape profile of channel extrusion 12.

Fig. 7 shows a schematic drawing of the angular movement possible by adjusting the expanding wedges 16 on each side of the glass or panel member 1 and support plate extrusion 13 assembly.

Once the glass or panel member 1 is adjusted to the position required, wedge assemblies both sides are tightened equally to generate the full clamping force required to keep the glass or panel member 1 in position. This clamping force also generates the downward component that wedges the lower edge of the glass or panel member assembly into the V profile of the channel section extrusion 12.

Fig. 8 shows a perspective view of a section of the various components of the system. Shown is channel extrusion 12 with glass or panel member 1 and support plate extrusions 13 each side. Shown are two nuts at the end of the expanding wedge assemblies. Tightening these nuts expands the wedges and generates the side clamping force required on the glass or panel member 1 and support plate extrusion 13 assembly.

Fig. 9 shows a perspective exploded view of a section of the various components of the system. Shown are expanding wedge assemblies 17 glass or panel member 1 support plate extrusions 13 and channel section extrusion 12.

Fig. 10 shows an expanding wedge assembly. As the nut 15 on the threaded rod 14 are tightened, the various segments of extrusions 16 are squeezed together. This results in the segments sliding in opposite directions as shown by the arrows 18 and generating a side force on channel section extrusion 12 and support plate extrusion 13.
It is to be understood that alternative embodiments of the invention could make the clamping extrusion 4 and support plate extrusion 13 parts from a process other than extrusion such as but not limited to machined or injection moulded processes.

It is to be understood that alternative embodiments of the invention could use panel members made from other rigid body materials such as but not exclusively wood, steel, plastic, plywood, or plasterboard.

Other arrangements are also useful.

Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of the words, for example "comprising" and "comprises", means "including but not limited to", and is not intended to (and does not) exclude other moieties, additives, components, integers or steps.

Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

Features, integers, characteristics, compounds, chemical moieties or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith.
CLAIMS:

1. A mechanism for the adjustment of the vertical alignment of a panel member contained within an elongated channel section comprising:
   one or more means of clamping the panel member with an adjustable force; and
   one or more support means for supporting the panel member within the channel section,

wherein the one or more means of clamping the panel member is arranged to adjustably tilt and secure the panel member so as to be maintained substantially vertically aligned even when the elongated channel section is secured to a surface which is not substantially horizontal.

2. A mechanism as in claim 1, wherein the adjustable clamping force applied to the panel member support means is arranged to be at some inclined angle to the panel member, such that there is a downward force component which clamps the lower edge of the panel member in the profile of the elongated channel section.

3. A mechanism as in claim 1 or 2, wherein the clamping force is adjusted by means of varying the distance between the support means and the inside surface of the elongated channel structure.

4. A mechanism as in claim 3, wherein the distance between the support means and the inside surface of the elongated channel structure is adjusted by means of turning the head of a threaded screw fastening, arranged between the distal faces of the support means and the elongated channel structure.

5. A mechanism as in claim 3, wherein the distance between the angled face of the support means and the inside surface of the elongated channel structure is adjusted by means of turning the head of a screw fastening, arranged to be parallel to the elongated channel section and on which are threaded a number of discrete abutting sliding wedge segments.
6. A panel member support system, comprising two or more of the mechanisms of claims 1 to 4, positioned along the length of an elongated channel section arranged to apply the adjustable forces at a number of discrete locations along the length of the panel member.

7. A panel member support system, comprising two or more of the mechanisms of claims 1 to 4, positioned along the length of an elongated channel section arranged to distribute the adjustable forces over the length of the panel member.

8. A balustrade comprising a panel member support system as in claim 6 or claim 7 together with a panel member.

9. A balustrade as in claim 8, wherein the panel member is made from glass, wood, steel, plastic, plywood, or other rigid material.

10. A method of adjusting the vertical alignment of a panel member contained with the panel member support system of claim 6 or claim 7, comprising the steps of tilting and securing one or more of the panel member clamping means.

11. A mechanism substantially as hereinbefore described with reference to the accompanying drawings.

12. A balustrade substantially as hereinbefore described with reference to the accompanying drawings.

13. A method substantially as hereinbefore described with reference to the accompanying drawings.