

HINGING ARRANGEMENT

FIELD OF THE INVENTION

The present invention relates to a hinging arrangement. More particularly but not exclusively it relates to a hinging arrangement for use in a divider panel assembly.

BACKGROUND

Divider assemblies, such as swinging panels and foldable doors, are known around the world, and may be preferred as an alternative to traditional swinging doors. Primarily, divider assemblies allow a room to be expanded in size by folding away to a small compact size. Divider assemblies may be used as room dividers, or as shop fronting, where it is not desirable to have a door obstructing the entrance to a shop, or obstructing the pathway outside or inside a shop.

Divider assemblies are usually constructed of a plurality of panels having a hinging assembly between each adjoining panel. The alternate hinging arrangements are configured to hinge in opposite directions, to typically allow the adjacent panels to abut each other in a snug relationship, thereby allowing for a compact configuration when the divider assembly is folded up. Typically, the hinging arrangements are moveable between a first position in which the panels are aligned in a planar fashion, and second position in which the panels lie alongside each other with their major sides facing each other.

Divider assemblies which are currently available have a disadvantage in that their hinging arrangements are not completely efficient. Prior art hinging arrangements leave a gap between the adjacent panels in at least one of the first position or the second positions as described above. A further disadvantage is that the hinging arrangement may be seen through the gaps that are left between the panels in one of the first or second positions, which may be unsightly and undesirable.

Another disadvantage of divider assemblies is that there may exist a degree of difficulty and resistance in causing the panels to flex when the panels and the hinge arrangements are laid out in a flat plane, and the force is applied to the extended panel on an edge of the plane. For this reason, divider assemblies are required to be disposed slightly out of alignment during operation, causing possible inefficiency in operation, as well as being aesthetically undesirable.

The drawback to the linking structure has been subjected to certain improvement in this field. Various means have been attempted to remove or to cover the linking structure.

One such attempt is described in US Patent 3,973,289 (Yulkowski), which describes a load-bearing door hinge which has a function of not allowing a door to be easily removed from its hinges. Yulkowski teaches the use of an internal U-shaped bracket which interacts with supporting members which are recessed to receive the arms of the bracket. However, this publication still allows a gap between the adjacent panels in at least one of the first or second positions.

US Patent 4,765,027 (Andric) describes a door hinge which is connected by a U-shaped bracket which interlinks with supporting members on the edge of the adjacent panels by means of hinge formations, including hinge pins. The brackets and support formations are also engaged with each other by gear cogs, so that the panels move in synchronization with each other. However, this hinging arrangement is complex, and may be costly to produce. It further does not address the problems of the gaps between adjacent panels in at least one of the first or second positions.

OBJECT OF THE INVENTION

It is an object of the present invention to provide a hinge arrangement which overcomes or at least ameliorates some of the abovementioned disadvantages or which at least provides the public with a useful choice.

SUMMARY OF THE INVENTION

According to a first aspect, the current invention may be said to broadly consist in a hinging arrangement suitable for connecting a pair of panels in a pivoting relationship between an aligned position, and a nested position, said hinging arrangement comprising:

- a substantially U-shaped bracket comprising a base member, and
- a pair of arm members extending from opposed ends of the base member to define a receiving recess between them; and
- a pair of engaging members, each engaging member comprising a body member,

wherein the body members are able to abut each other in both the aligned position and the nested position;

a curved leg formation extending from the body member,

wherein the leg formation of each of the pair of engaging members is configured and dimensioned to be received into the receiving recess of the bracket, and

wherein each of the curved leg formations has the same outer radius, and is engageable with the bracket to allow pivotal movement of the engaging members relative to each other, so that the smallest distance between the outer radii of the respective leg formations is capable of remaining substantially constant when the engaging members pivot relative to each other. Preferably, each of the curved leg formations is slidably engageable with a curved surface on the inside of each of the arm members of the bracket to allow relative pivotal movement of the engaging members relative to each other.

Preferably, the engaging members are pivotably movable relative to each other about the bracket between

a nested position in which the engaging members are nested alongside each other, and

an aligned position in which the engaging members are aligned in a planar fashion.

Preferably, the leg formations each define a circular concave inner surface for sliding engagement with complementary convex surfaces on the bracket.

Alternately, each of the curved leg formations is engageable with the bracket by means of an articulated hinge arrangement to allow relative pivotal movement of the engaging members relative to each other.

Preferably, the articulated hinge arrangement may comprise an articulated member, which is pivotally engaged by means of a hinge at opposed ends to the leg formation and the bracket respectively

Preferably, each of the engaging members includes a first abutment surface and a second abutment surface on either side of the leg formations.

Preferably, the engaging members are pivotably movable relative to each other about the bracket between

a first position in which the first abutment surfaces substantially abut each other, and

a second position in which the second abutment surfaces of the engaging members substantially abut each other.

Preferably, the first abutment surface and second abutment surface of each of the engaging members are disposed at right angles to each other.

Preferably, the planes of the first abutment surface and second abutment surface of each of the engaging members are tangential to the outer radius of their respective associated leg formations. Preferably, the receiving recess of the bracket defines a pair of curved

passages for guiding the leg formations during relative pivoting movement of the engaging members.

Preferably, the curved passages are configured and dimensioned to prevent removal of the leg formations from the receiving recess when both leg formations are at least partially received into the receiving recess.

Preferably, the engaging members each comprise a recess into which the bracket is at least partially receivable when said adjacent panels are in their nested position.

Preferably, the U-shaped bracket is elongate in nature, and defines a U-shape in transverse cross section.

Preferably, the engaging members are elongate in nature, and define leg formations in a transverse cross section.

Preferably, the engaging members are integrally formed.

Preferably, the engaging members are integrally formed in an extrusion process.

Preferably, the bracket is integrally formed.

Preferably, the bracket is integrally formed in an extrusion process. Preferably, the bracket and engaging members are slidably engageable and/or disengageable in a longitudinal sliding fashion.

Preferably, the engaging members are adapted and configured to be secured to an edge of a panel.

Preferably, the engaging members include engaging formations for securing the engaging members to an edge of a panel.

Alternatively, the engaging members may be integral with a panel.

Preferably, the engaging members mirror each other in structure.

Alternately, the engaging members may complement each other in structure, to fit together in a complementary fashion when the panels are aligned.

According to a second aspect, the current invention may be said to broadly

consist in a hinging arrangement suitable for connecting a pair of panels in a pivoting relationship, said hinging arrangement comprising:

- a substantially U-shaped bracket comprising

- a base member, and

- a pair of arm members extending from opposed ends of the base member to define a receiving recess between them; and

- a pair of engaging members, each engaging member comprising a body member,

- wherein the body members are able to abut each other in both the aligned position and the nested position;

- a curved leg formation extending from the body member,

- wherein the leg formation of each of the pair of engaging members is configured and dimensioned to be received into the receiving recess of the bracket, and

- wherein each of the curved leg formations has the same outer radius, and is engaged with the bracket to allow pivotal movement of the engaging members relative to each other, so that the gap between the outer radius of each of the leg formations remains constant. Preferably, the gap between the outer radius of each of the leg formations remains constant and proximate each other.

According to a third aspect, the current invention may be said to

broadly consist in a hinging arrangement suitable for connecting a pair of

panels in a pivoting relationship, said hinging arrangement comprising: a substantially U-shaped bracket comprising

- a base member, and

- a pair of arm members extending from opposed ends of the base member to define a receiving recess between them; and

- a pair of engaging members, each engaging member comprising a body member,

- wherein the body members are able to abut each other in both the aligned position and the nested position;

- a curved leg formation extending from the body member,

- wherein the leg formation of each of the pair of engaging members is configured and dimensioned to be received into the receiving recess of the bracket, and

wherein each of the curved leg formations has the same outer radius, and is pivotably engaged with the bracket for rotation about a pivot axis, and

wherein the distance between the pivot axes of the leg formations is substantially twice the outer radius of each of the curved leg formations. Preferably, the distance between the pivot axes of the leg formations is

substantially twice the outer radius of each of the curved leg formations, while allowing for free movement between the leg formations.

According to a fourth aspect, the current invention may be said to broadly consist in a hinging arrangement suitable for connecting a pair of panels in a pivoting relationship, said hinging arrangement comprising: a substantially U-shaped bracket comprising

a base member, and

a pair of arm members extending from opposed ends of the base member to define a receiving recess between them; and

a pair of engaging members, each engaging member comprising a body member,

wherein the body members are able to abut each other in both the aligned position and the nested position;

a circularly curved leg formation extending from the body member,

wherein the leg formation of each of the pair of engaging members is configured and dimensioned to be received into the receiving recess of the bracket to provide pivotal movement of the engaging member about the bracket, and

wherein each of the curved leg formations has a circular curve, and the centre of the circle coincides with the centre of rotation of the associated engaging member about the bracket.

According to a fifth aspect, the current invention may be said to broadly consist in a divider assembly comprising at least two panels pivotally connected by means of a hinging arrangement as described above.

According to a sixth aspect, the current invention may be said to broadly consist in a divider assembly comprising at least two panels pivotally connected by means of a hinging arrangement as described above, the two panels being connected at the opposed outer ends by a 4-way hinge.

Other aspects of the invention may become apparent from the following description which is given by way of example only and with reference to the

accompanying drawings.

As used herein the term "and/or" means "and" or "or", or both.

As used herein "(s)" following a noun means the plural and/or singular forms of the noun.

The term "comprising" as used in this specification [and claims] means "consisting at least in part of". When interpreting statements in this specification [and claims] which include that term, the features, prefaced by that term in each statement, all need to be present but other features can also be present. Related terms such as "comprise" and "comprised" are to be interpreted in the same manner.

To those skilled in the art to which the invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the scope of the invention as defined in the appended claims. The disclosures and the descriptions herein are purely illustrative and are not intended to be in any sense limiting.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of example only and with reference to the drawings in which:

Figure 1 shows a transverse cross section of a first embodiment of a U-shaped bracket,

Figure 2 shows a transverse cross section of a first embodiment of an engaging member,

Figure 3 shows a transverse cross section of a first embodiment of a U-shaped bracket and an engaging member being engaged with each other,

Figure 4 shows a transverse cross section of a U-shaped bracket and an engaging member in engagement with each other,

Figure 5 shows a transverse cross section of a first embodiment of a hinging arrangement in a nested position,

Figure 6 shows a transverse cross section of a first embodiment of a hinging arrangement moving between a nested position and an aligned position,

Figure 7 shows a transverse cross section of a first embodiment of a hinging arrangement in an aligned position,

Figure 8 shows a cutaway perspective view of a first embodiment of a divider assembly,

Figure 9 shows a cutaway plan view of a second embodiment of a divider

assembly in an aligned position,

Figure 10 shows a cutaway plan view of a second embodiment of a divider assembly in a nested position, and

Figure 11 shows a cutaway plan view of a second embodiment of a divider assembly. (alternative slanted hinge)

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

With reference to the above drawings, in which similar features are generally indicated by similar numerals, a hinging arrangement according to a first aspect of the invention is generally indicated by the numeral 100, and a divider assembly according to the invention is generally indicated by the numeral 200.

According to a first aspect there is provided a hinging arrangement 100 suitable for connecting a pair of panels 14 in a pivoting relationship between an aligned position (as shown in figure 7), and a nested position (as shown in figure 5).

The said hinging arrangement comprises an elongate extruded U-shaped bracket 1 and a pair of elongate extruded engaging members 5: The U-shaped bracket 1 includes comprised of a base member 2, and a pair of arm members 3 extending from opposed ends of the base member 2 to define a receiving recess 4 between them. The receiving recess 4 defines a pair of curved passages 12, each for receiving a curved leg formation 7 and guiding movement of the leg formation 7 during pivoting movement of the hinging arrangement 100. The curved passages 12 further serve to prevent removal of the leg formations 7 from the receiving recess 4 when both leg formations 7 are at least partially received into the receiving recess 4.

The engaging members 5 each comprise a body member 6 and a curved leg formation 7 extending from the body member 6. The engaging members 5 may be engaged with an edge of a panel 14 by various means, possibly through engagement formations on the engaging members. The combination of at least a pair of panels 14 pivotally connected by the hinging arrangement forms a divider assembly 200 (as shown in figure 8). It is envisaged that in another embodiment (shown in figure 9), the engaging members 5 could be integrally formed with a panel 14.

The leg formation 7 of each of the pair of engaging members 5 is configured and dimensioned to be received into the curved passage 12 defined by the bracket 1. The leg formations 7 are circularly curved in cross section, and define an outer radius 8. Each leg formation 7 further defines a circular concave inner surface 20 for sliding

engagement with complementary convex surfaces 21 on the bracket 1.

Each of the circularly curved leg formations 7 has the same outer radius 8, and is engageable with the bracket 1 to allow pivotal movement of the engaging members 5 relative to each other, and the bracket 1, about separate axes or rotation 23.

The engaging members 5 are pivotably movable relative to each other about the bracket 1 between a nested position (shown in figure 5) in which the engaging members 5 and panels 14 are nested alongside each other, and an aligned position (shown in figure 7) in which the engaging members 5 and panels 14 are aligned in a planar fashion.

During pivotal movement of the engaging members 5 relative to each other, the distance (shown as arrow D in Figures 5 and 6) between the separate axes of rotation 23 of each engaging formation 5 about the bracket 1 remains constant. The leg formations 7 each have a circular curve with an outer radius 8 which is half the distance D or slightly less than half the distance D, so that the gap d (shown as arrow d in Figures 5 and 7) between the outer radii of the respective leg formations 7 is negligible, while allowing for free movement between the leg formations 7. As the engaging members 5 pivot relative to each other, the smallest distance or gap d between the outer radii 8 of the respective leg formations 7 remains substantially constant. Preferably the gap d is small or tending towards negligible, to provide an aesthetically pleasing look for the hinging arrangement 100. The gap d remains substantially constant as the curved leg formations 7 have a circular curve, and the centre of the circle coincides substantially with the axes of rotation 23 of the associated engaging members 5 about the bracket 1. It is recognized by the inventor that the axes of rotation may move slightly in the embodiments shown in figure as a hinge is not used, however this movement will be negligible. It is envisaged that in other embodiments, the engaging members can be pivotally engaged to the bracket by means of hinges (not shown).

In this way, the gap d between the respective adjacent engaging members 5 can be kept at a minimum distance when the engaging members 5 and panels are pivoted relative to each other, preventing unsightly gaps and presenting an aesthetically desirable divider assembly 200.

As shown in figure 2, each of the engaging members 5 includes a first abutment surface 10 and a second abutment surface 11 on either side of the leg formation 7. The first abutment surface 10 and second abutment surface 11 of each of

the engaging members 5 are disposed at right angles to each other, and extend tangentially to the outer radius 8 of their respective associated leg formations 7. When the panels 14 are pivoted relative to each other between their nested and aligned positions, the engaging members 5 also pivot relative to each other about the bracket 1 between a first position (corresponding to the aligned position of the panels) in which the first abutment surfaces 10 abut each other, and a second position (corresponding to the nested position of the panels) in which the second abutment surfaces 11 of the engaging members 5 substantially abut each other.

The engaging members 5 each further comprise a recess 25 into which the bracket 1 is at least partially receivable when said adjacent panels are in their aligned position and the first abutment surfaces of the engaging members 5 are abutting each other in their first position. As seen in Figs. 5-7, each recess 25 is defined on three sides by the leg formation 7 and connecting surfaces 90 and 91. Connecting surfaces 90 and 91 connect each corresponding first abutment surface 10 to the corresponding second abutment surface 11. As shown in Fig. 7, leg formation 7 has a first segment 77 which can be formed as a coplanar extension with second abutment surface 91 and a second segment 88 which is at a near right angle with first segment 77. In the embodiment of Fig. 7, second segment 88 is also generally parallel with connecting surface 91), and connecting surface 90 can be parallel to segment 77 of leg formation 7, and at a near right angle with connecting surface 91. Fig. 7 shows bracket 1 with the base member 2 with arms 3 extending from opposite sides 92, 93 of the base member, and, in a similar manner, connecting surfaces 91 are on the opposite sides 92, 93 of the base member when the engaging members 5 are in the second position.

In the embodiments shown in figure 7, it will be seen that the engaging members essentially mirror each other in structure. This is convenient for mass production purposes. However, this need not necessarily be the case. As shown in figure 11, the engaging members 5 do not mirror each other, and instead complement each other's shape. However, the engaging members 5 still present an aesthetically pleasing look when they are in their first position (corresponding to the aligned position of the panels 14).

The above preferred embodiment of hinging arrangement 100 can be readily assembled by sliding the bracket 1 relative to the engaging members 5 to engage or disengage them with each other. Since the hinging arrangement only comprises three moving parts (i.e. the bracket 1 and the pair of engaging members 5), this embodiment

provides a simple and aesthetically pleasing solution.

Figure 8 shows a typical divider assembly 200 having hinging arrangements disposed in a reversed alignment between alternate panels 14. However, alternative arrangements are possible as shown in figure 9.

Figure 9 shows a divider assembly 200 according to another embodiment of the invention. The divider assembly 200 is made up of two sets of two panels 14 which are coupled by a hinging arrangement 100 according to the invention. The panels 14 are also connected at their opposed outer ends by a 4-way hinge 210.

The 4-way hinge 210 is coupled to another two sets of two panels 14, which are in turn linked to another 4-way hinge, and so forth. This sequence goes on till the required length of the divider assembly 200 is achieved.

Figure 9 shows the divider assembly in an aligned position, where all the panels 14 are aligned in a planar fashion. The panels 14 are engaged with each other either by use of a hinging arrangement 100 according to a first embodiment, or a 4-way hinge 210. It may be seen that within one series of two sets of two panels 14, each set of two panels 14 are diametrically opposed to one another. This arrangement provides an additional security benefit, as the inward facing brackets 1 do not allow for tampering by a would-be intruder.

Further, it may be noted that due to the approach in which the hinging arrangement allows for the panels to open, when the panels 14 are in an aligned position, an attempt to force entry by directing force at engaging members 5 on the face external to the bracket 1, would likely not succeed. This is due to the self-jamming motion of the engaging members, i.e. the engaging members 5 would not be able to pivot in an opposite direction about bracket 1.

Figure 10 shows the divider assembly of figure 9 in a nested position, where the panels 14, which are coupled by a hinging arrangement 100 according to the invention, are adjacent to one another.

Figure 3 and figure 4 are used to show the engagement of the members of the hinging arrangement 100. The hinging arrangement 100 can extend along the length of a panel 14, which may be a door or window. As shown in Figure 3, a bracket 1 is shown being engaged with a single engaging member 5. The bracket 1 can accept the leg formation 7 of a single engaging member 5 into the U-shaped receiving recess 4 in a direction which is transverse to the axes of rotation of the engaging members 5 about the bracket 1.

This assists in assembly and installation of the hinging arrangement 100. However, the engagement of the second leg formation 7 with the bracket 1 can only be accomplished by sliding the engaging member 5 and bracket 1 in a longitudinal direction relative to each other. This is because there is no longer sufficient space for a similar leg formation 7 to fit through the recess 4 after one leg formation 7 has already been engaged.

It is also possible that engaging members 5 can be engaged with the bracket 1 by slidably engaging them in a longitudinal direction.

As shown in Figure 11, the engaging members 5 need not be of a substantially rectangular shape. The abutment surfaces 10, 11 of the engaging members 5 are not perpendicular to each other in this embodiment, but instead extend at an acute angle and complementary obtuse angle to each other respectively.

A particular advantage of a divider assembly 200 according to the invention, is that the engaging members need no specific modification when the divider assembly is used in a curved format (i.e. to close off a curved locality). In such a curved divider assembly 200, the panels are not completely aligned with each other, but are slightly misaligned, with the combined increments in alignment forming a curved shape for the whole divider assembly 200. When prior art divider assemblies were used, the difference in length between the inner radius of the curve and the outer radius of the curve (not shown) would mean that especially large gaps were formed between panels at the outer radius. This problem is mitigated by the current invention, since the gap remains constant even at small angles of misalignment of the panels and/or engaging members 5. This is especially so when the hinging arrangement 100 as shown in Figure 11 is utilized.

Where in the foregoing description reference has been made to elements or integers having known equivalents, then such equivalents are included as if they were individually set forth.

Although the invention has been described by way of example and with reference to particular embodiments, it is to be understood that modifications and/or improvements may be made without departing from the scope or spirit of the invention. For example, it may be possible that more than one hinging arrangement 100 can be used in the coupling of two panels 14 in a divider assembly 200

CLAIMS:

What is claimed is:

1. A divider assembly comprising, in combination:
 - a pair of panels;
 - a pair of engaging members on opposite edges of each panel and movable between a first position and a second position,
 - wherein each engaging member has a first abutment surface, a second abutment surface and connecting surfaces connecting each first abutment surface to the corresponding second abutment surface, and a leg formation,
 - wherein the first abutment surfaces abut each other when the engaging members are in the second position, and the second abutment surfaces abut each other when the engaging members in the first position; and
 - a bracket comprising a base member and a pair of arms extending from opposite sides of the base member, pivotably connected to both the first engaging member and the second engaging member, wherein the base member of the bracket is positioned between one of the connecting surfaces and the leg formation when the engaging members are in the second position.
2. The divider assembly of claim 1, wherein each leg formation is slidably engageable with a curved surface a corresponding arm.
3. The divider assembly of claim 1 or 2, wherein each leg formation defines a circular concave inner surface for sliding engagement with a corresponding complementary convex surface on the bracket.
4. The divider assembly of any of claims 1, 2 or 3, wherein each first abutment surface is disposed at a right angle with respect to the corresponding second abutment surface.
5. The divider assembly of any of claims 1-4, wherein the engaging members are integrally formed.
6. The divider assembly of claim 5, wherein the engaging members are integrally

formed in an extrusion process.

7. The divider assembly of any of claims 1-6, wherein the bracket is integrally formed.

8. The divider assembly of claim 7, wherein the bracket is integrally formed in an extrusion process.

9. The divider assembly of claim 1, wherein the bracket and engaging members are slidably engageable and/or disengageable in a longitudinal sliding fashion.

10. The divider assembly of claim 1, wherein each leg formation cooperates with the corresponding connecting surfaces to define a recess,

11. The divider assembly of claim 1, wherein each engaging member has engaging formations for securing the engaging members to the corresponding edge of the corresponding panel.

12. The divider assembly of any of claims 1-11, wherein at least one of the engaging members are integrally formed with a panel.

13. The divider assembly of any of claims 1-12, wherein each leg formation has a first segment extending from the second abutment surface, and a second segment formed at a right angle with respect to the first segment.

14. The divider assembly of claim 13 wherein the first segment of the leg formation is coplanar with the second abutment portion.

15. The divider assembly of claim 14 wherein the first abutment segment is parallel to the first segment of the leg formation.

16. The divider assembly of claim 15 wherein the contacting surfaces and the leg formation cooperate to define three sides of the recess.

17. The divider assembly of any of claims 1 to 16 further comprising a 4-way hinge connecting four panels together at an outer edge of each panel opposite the edge to which the bracket is connected.