

## HINGE ASSEMBLY FOR A ROLLER DOOR

### **Field of the Invention**

- 5     The present invention relates to roller doors. In form, the present invention relates to hinge assemblies for roller doors.

### **Background of the Invention**

- 10    A known design for roller doors consists of a plurality of horizontally elongate panels connected by horizontally elongate hinge members between each panel. The hinge members allow the adjacent panels to pivot with respect to the hinge member, thus enabling the door to be rolled up into a storage position.
- 15    Typically, the connection between each hinge member and adjacent panels is made by generally cylindrical rod portions formed at the first and second edges of the panels which are received in correspondingly shaped grooves in the first or second edges of the hinge members. Roller doors of this construction are simple to manufacture and assemble. However, some roller doors do not allow for significant
- 20    pivoting of the panels relative to their adjacent hinge members and accordingly the roller doors cannot be rolled up very tightly.

### **Summary of the Invention**

- 25    According to an aspect of the present invention, there is provided a hinge assembly for a roller door comprising:
- a hinge member, first and second panels and at least one retainer, wherein the hinge member hingedly interconnects the first and second panels to one another to allow relative pivoting movement of the panels with respect to each
- 30    other, and wherein:
- the first and second panels are each elongate and comprise first and second curved hinge elements at respective first and second edges of each panel, one of the curved hinge elements curving in a first direction and the other curved hinge element curving in a second direction;

the hinge member is elongate and has opposing inner and outer surfaces, opposing first and second edges and opposing first and second ends, the hinge member also comprising a first curved slot located towards the second edge for receiving the first curved element of the first panel and a second curved slot  
5 located towards the first edge for receiving the second curved hinge element of the second panel; and

the hinge member also comprising a coupling portion at at least one of the first and second ends, the retainer configured to be coupled in one of the coupling portions so as to retain the curved hinge elements of the panels in  
10 respective first and second curved slots of the hinge member.

According to another aspect of the present invention, there is provided a hinge member of a hinge assembly for a roller door, the hinge member being elongate and having opposing inner and outer surfaces, opposing first and second edges and  
15 opposing first and second ends, the hinge member comprising:

a first curved slot, located towards the second edge for receiving a curved hinge element of a first panel adjacent to the hinge member in the hinge assembly;

a second curved slot, located towards the first edge for receiving a  
20 curved hinge element of a second panel adjacent to the hinge member in the hinge assembly; and

a coupling portion at at least one of the first and second ends for a retainer to couple in, the coupling of the retainer with the coupling portion thereby retaining the curved hinge elements of the first and second panels in respective first  
25 and second curved slots in the hinge assembly.

According to a further aspect of the present invention, there is provided a roller door formed from a plurality of hinge assemblies according to aspects of the present invention defined herein.

30 In one form, the first and second curved slots extend between the first and second ends of the hinge member.

In one form, the first and second curved slots are open at at least one of the first  
35 and second ends of the hinge member

In one arrangement, the first and second curved slots are open at the first and second ends of the hinge member. In this arrangement, the curved hinge elements are inserted into their respective curved slots through the first or second end of the hinge member.

In another arrangement, the first and second curved slots are closed at one of the first or second ends of the hinge member and open at the other end. In this arrangement, the curved hinge elements are inserted into their respective curved slots through the open end.

In one form, the first curved slot opens in the inner or outer surface of the hinge member, preferably the inner surface.

In an embodiment, the first curved slot curves initially from its opening in the inner surface in a direction away from the second edge before curving towards the second edge and then towards the inner surface.

In one form, a first abutment portion for the first panel to abut when the first curved hinge element is rotated partially out of the first curved slot is located between the opening of the first curved slot in the inner surface and the second edge of the hinge member.

In one form, the first abutment portion is a shallower portion of the hinge member's inner surface.

In one form, the first abutment portion is parallel to the longitudinal plane defined by the hinge member.

In an embodiment, the second curved slot opens in the first edge.

In an embodiment, the second curved slot curves initially from its opening in the first edge in a direction away from the first edge before curving towards the inner surface and then towards the first edge.

In an embodiment, the second curved slot widens towards its opening in the first edge.

5 In an embodiment, the opening of the second curved slot in the first edge defines a second abutment portion for the second panel to abut when the second curved hinge element is rotated partially out of the second curved slot.

10 In one form, the second abutment portion comprises a planar surface which is angled relative to the longitudinal plane defined by the hinge member.

In one form, the hinge member comprises coupling portions at first and second ends and the hinge assembly comprises two retainers.

15 In an embodiment, each coupling portion comprises a socket opening at respective ends of the hinge member.

In an embodiment, the coupling portions comprise a socket extending the length of the hinge member.

20 In one form, the socket(s) are formed between the inner and outer surfaces and the first and second edges of the hinge member.

25 In an embodiment, each retainer comprises a head portion for covering at least part of the openings of the curved slots at one of the ends of the hinge member so as to retain the curved hinge elements of the panels in respective first and second curved slots of the hinge member.

30 In an embodiment, each retainer comprises a projection to couple in one of the coupling portions. The projection extends from the head portion.

In one form, the projections are provided with threads or ribs which in one arrangement tighten the fit of the projections with the coupling portion or in another arrangement interact with correspondingly shaped threads, ribs or grooves which form part of the coupling portion.

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In an embodiment, each retainer is fastened to the hinge member by bonding to the hinge member, such as by gluing or soldering for example.

5 In another embodiment, each retainer is fastened to the hinge member by application of a fastener transversely through the inner and outer surfaces of the hinge member and the retainer.

The fastener may be any suitable fastener such as a rivet, a staple, a screw or a nail for example. However, in a preferred embodiment, the fastener is a nail.

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### **Brief Description of the Drawings**

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

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Figures 1 to 8 are first, second, front, rear, side and perspective views of a hinge member of a hinge assembly according to an embodiment of the present invention;

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Figure 9 is a partial perspective view of a roller door formed from a plurality of hinge assemblies according to an embodiment of the present invention, each hinge assembly incorporating the hinge member shown in Figures 1 to 8;

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Figure 10 is a partial perspective view of the roller door which comprises a plurality of hinge assemblies according to an embodiment according to an embodiment of the present invention, each hinge assembly incorporating the hinge member shown in Figures 1 to 8;

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Figure 11 is a magnified view of one of the hinge assemblies of the roller door of Figure 10;

Figure 12 is an exploded view of one of the hinge assemblies of the roller door of Figure 10; and

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Figure 13 is an end view of first and second panels connected to the hinge member of Figures 1 to 8 in one of the hinge assemblies of the roller door of Figure 10.

### **Detailed Description of Embodiments**

5 With reference to the Figures, there is shown a roller door 1 according to an embodiment of the present invention. The roller door comprises a plurality of hinge assemblies 10 assembled together to form the roller door 1.

Each hinge assembly 10 comprises two elongate panels 11, 12 connected by an  
10 elongate hinge member 13 to allow relative pivoting movement of the panels 11, 12 with respect to each other. The panels 11, 12 and hinge member 13 are elongate in the horizontal direction and are thus configured with the first panel 11 above the hinge member 13 which in turn is above the second panel 12 when the roller door is deployed in its unrolled configuration.

15 The two panels 11, 12 are substantially identical but for convenience will be hereafter referred to as a first panel 11 and a second panel 12. The first and second panels 11, 12 comprise a substantially planar section 14 with first and second curved hinge elements 15, 16 at respective first and second edges 17, 18. The  
20 curved hinge elements 15, 16 extend the length of the panels 11, 12. The first curved hinge element 15 curves from one side of the planar section 14 in a first direction back towards the planar section and the second curved hinge element 16 curves from the other side of the planar section 14 in a second direction back towards the planar section. The whole of each panel 11, 12, including the planar  
25 section 14 and the curved hinge elements 15, 16 is of generally unitary thickness and can be formed (usually by extrusion) of any suitable material such as aluminium or plastic. The curved hinge elements 15, 16 are identical in size and shape.

The hinge member 13 comprises opposing inner and outer surfaces 20, 21,  
30 opposing first and second edges 22, 23 and opposing first and second ends 24, 25. At the second edge 23 of the hinge member is a first curved slot 26 extending the length of the hinge member between first and second ends 24, 25. For convention, the first curved slot 26 is for receiving the first curved element 15 at the first edge 17 of the first panel 11 in the hinge assembly. However, it is to be understood that due  
35 to the design of the panels 11, 12, the first curved slot 26 could receive the other

curved element of the panels (but this would affect which curved element is received in a second curved slot of the hinge member described below).

5 The first curved slot 26 of the hinge member 13 has an opening 27 in the inner surface 20 of the hinge member 13 and curves from its opening back towards the inner surface. The curvature of the first slot 26 is such that it initially extends from its opening 27 away from the second edge before curving towards the second edge and then towards the inner surface.

10 The opening 27 of the first curved slot 26 defines a first abutment portion 28 for the first panel 11 to abut when the first curved hinge element 15 is rotated partially out of the first curved slot 26. The abutment portion 28 prevents the first curved hinge element 15 over-rotating and coming completely out of the first curved slot 26. The abutment portion 28 comprises a shallower portion of the hinge member's inner  
15 surface 21, which is shallower by the thickness of the panels 11, 12. The abutment portion 28 is also located between the opening 27 of the slot and the second edge 23 of the hinge member. The abutment portion 28 is parallel to the portion of the inner surface 21 on the other side of the first slot opening 27 and is parallel to the longitudinal plane defined by the hinge member 13.

20 At the first edge 22 of the hinge member 13 is a second curved slot 30 extending the length of the member between first and second ends 24, 25. The second curved slot 30 is for receiving the second curved hinge element 16 at the first edge 17 of the second panel 12 in the hinge assembly. The second curved slot 30 has an  
25 opening 31 in the first edge 17 of the hinge member 13 and curves from its opening back towards the first edge. The curvature of the second slot 30 is such that it initially extends from its opening 31 away from the first edge before curving towards the inner surface 20 and then towards the first edge.

30 The second slot 30 widens towards its opening 31, which defines a second abutment portion 32 for the second panel 12. The second panel 12 abuts the abutment portion 32 when the second curved hinge element 16 is partially rotated out of the second curved slot 30. The abutment portion 32 prevents the second curved hinge element 16 over-rotating and coming completely out of the second  
35 curved slot 30. The abutment portion 32 comprises a planar surface extending the

length of the hinge member which is angled relative to the longitudinal plane defined by the hinge member 13.

5 The arrangement of the curved hinged elements 15, 16 received in the curved slots 26, 30 allows for much greater rotation of the panels 11, 12 relative to the hinge member 13 as compared to the conventional arrangement of cylindrical rod portions received in correspondingly shaped grooves. This enables a roller door constructed from a plurality of the hinge assemblies 10 of embodiments of the present invention to be rolled up tighter in the roller door's storage configuration. Thus, the roller door  
10 can advantageously occupy a smaller space.

The curved slots 26, 30 are open at the first and second ends 24, 25 of the hinge member 13. Thus, the hinge assembly 10 (and thus a roller door formed from a plurality of the hinge assemblies) is assembled by inserting the curved hinge elements 15, 16 into respective curved slots 26, 30 through their opening at the first  
15 or second end of the hinge member and sliding the curved hinge elements along the length of the slots.

To retain the curved hinge elements 15, 16 so assembled in the curved slots 26, 30, the hinge assembly 10 comprises two retainers 40 and the hinge member 13  
20 comprises a coupling portion in the form of a socket 41 at each of first and second ends 24, 25 of the member. This is shown in particular in Figures 10 to 12. The retainers 40 couple in the coupling portion 41 at respective ends of the hinge member so as to retain the curved hinge elements in their respective curved slots. The socket 41 at each end of the hinge member is generally rectangular in cross-  
25 section, but may be of any shape as required. Separate sockets may be formed at each end of the hinge member 13. However in the embodiment shown in the Figures, the hinge member 13 advantageously comprises a single socket extending the length of the member which enables the member to be easily extruded and cut to any length required. The socket 41 is located between the inner and outer  
30 surfaces 20, 21 and first and second edges 22, 23 of the hinge member 13 and spaces apart the first and second curved slots 26, 30.

Each retainer comprises a head portion 42 for covering at least part of the openings of the slots 26, 28 in one of the ends of the hinge member. The head portion 42 thus  
35 prevents the curved hinge members 15, 16 from sliding out of the curved slots 26,

30. Each retainer also comprises a projection 43 extending from the head portion 42 to be received in the socket 41 of the hinge member 13. To fasten the retainers 40 to the hinge member 13, the projections may be provided with threads or ribs which may tighten the fit of the projections with the internal walls of the socket or may  
5 interact with correspondingly shaped threads, ribs or grooves formed on the internal walls of the socket. The retainers may be fastened to the hinge member by bonding to the hinge member (eg. gluing or soldering) or by application of a fastener transversely through the inner and outer surfaces 20, 21 of the hinge member and the projection 43 of the retainer 40 positioned therebetween. The fastener may be  
10 any suitable fastener such as a rivet, a staple, a screw or a nail for example. However, in a preferred embodiment, the fastener is a nail 44 because it can be applied quickly and repetitively to multiple hinge assemblies when constructing a roller door by use of a nail gun.

15 In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of  
20 the invention.

**CLAIMS**

1. A hinge assembly for a roller door comprising:

5 a hinge member, first and second panels and at least one retainer,  
wherein the hinge member hingedly interconnects the first and second panels to  
one another to allow relative pivoting movement of the panels with respect to each  
other, and wherein:

10 the first and second panels are each elongate and comprise first and  
second curved hinge elements at respective first and second edges of each panel,  
one of the curved hinge elements curving in a first direction and the other curved  
hinge element curving in a second direction;

15 the hinge member is elongate and has opposing inner and outer  
surfaces, opposing first and second edges and opposing first and second ends, the  
hinge member also comprising a first curved slot located towards the second edge  
for receiving the first curved element of the first panel and a second curved slot  
located towards the first edge for receiving the second curved hinge element of the  
second panel; and

20 the hinge member also comprising a coupling portion at at least one  
of the first and second ends, the retainer configured to be coupled in one of the  
coupling portions so as to retain the curved hinge elements of the panels in  
respective first and second curved slots of the hinge member.

25 2. A hinge assembly according to claim 1, wherein the first and second  
curved slots extend between the first and second ends of the hinge member.

3. A hinge assembly according to claim 1 or 2, wherein the first and  
second curved slots are open at at least one of the first and second ends of the  
hinge member

30 4. A hinge assembly according to any one of the preceding claims,  
wherein the first curved slot opens in the inner surface of the hinge member and  
curves initially from its opening in the inner surface in a direction away from the  
second edge before curving towards the second edge and then towards the inner  
surface.

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5. A hinge assembly according to any one of the preceding claims, wherein the first curved slot opens in the inner surface of the hinge member and a first abutment portion for the first panel to abut when the first curved hinge element is rotated partially out of the first curved slot is located between the opening of the first curved slot in the inner surface and the second edge of the hinge member.

6. A hinge assembly according to any one of the preceding claims, wherein the second curved slot opens in the first edge of the hinge member and curves initially from its opening in the first edge in a direction away from the first edge before curving towards the inner surface and then towards the first edge.

7. A hinge assembly according to claim 6, wherein the second curved slot widens towards its opening in the first edge.

8. A hinge assembly according to any one of the preceding claims, wherein the second curved slot opens in the first edge of the hinge member and a second abutment portion for the second panel to abut when the second curved hinge element is rotated partially out of the second curved slot is defined by the opening of the second curved slot and comprises a planar surface which is angled relative to the longitudinal plane defined by the hinge member

9. A hinge assembly according to any one of the preceding claims, wherein the hinge member comprises coupling portions at first and second ends and the hinge assembly comprises two retainers.

10. A hinge assembly according to any one of the preceding claims, wherein each coupling portion comprises a socket opening at respective ends of the hinge member.

11. A hinge assembly according to claim 9, wherein the coupling portions comprise a socket extending the length of the hinge member.

12. A hinge assembly according to claims 10 or 11, wherein the socket(s) are formed between the inner and outer surfaces and the first and second edges of the hinge member.

13. A hinge assembly according to any one of the preceding claims,  
wherein each retainer comprises a head portion for covering at least part of the  
openings of the curved slots at one of the ends of the hinge member so as to retain  
5 the curved hinge elements of the panels in respective first and second curved slots  
of the hinge member.

14. A hinge assembly according to claim 13, wherein each retainer  
comprises a projection to couple in one of the coupling portions, the projection  
10 extending from the head portion.

15. A hinge assembly according to claim 14, wherein the projection of  
each retainer is provided with threads or ribs.

15 16. A hinge assembly according to any one of the preceding claims,  
wherein each retainer is fastened to the hinge member by bonding to the hinge  
member.

17. A hinge assembly according to any one of the preceding claims,  
20 wherein each retainer is fastened to the hinge member by application of a fastener  
transversely through the inner and outer surfaces of the hinge member and the  
retainer.

18. A hinge member as defined as part of the hinge assembly according  
25 to any one of the preceding claims.

19. A hinge member of a hinge assembly for a roller door, the hinge  
member being elongate and having opposing inner and outer surfaces, opposing  
first and second edges and opposing first and second ends, the hinge member  
30 comprising:

a first curved slot, located towards the second edge for receiving a  
curved hinge element of a first panel adjacent to the hinge member in the hinge  
assembly;

a second curved slot, located towards the first edge for receiving a curved hinge element of a second panel adjacent to the hinge member in the hinge assembly; and

- 5 a coupling portion at at least one of the first and second ends for a retainer to couple in, the coupling of the retainer with the coupling portion thereby retaining the curved hinge elements of the first and second panels in respective first and second curved slots in the hinge assembly.

20. A roller door formed from a plurality of hinge assemblies according to  
10 any one of claims 1-17.

## HINGE ASSEMBLY FOR A ROLLER DOOR

### ABSTRACT

5 A hinge assembly for a roller door comprising:

a hinge member, first and second panels and at least one retainer,  
wherein the hinge member hingedly interconnects the first and second panels to one  
another to allow relative pivoting movement of the panels with respect to each other,  
and wherein:

10 the first and second panels are each elongate and comprise first and  
second curved hinge elements at respective first and second edges of each panel, one  
of the curved hinge elements curving in a first direction and the other curved hinge  
element curving in a second direction;

the hinge member is elongate and has opposing inner and outer  
15 surfaces, opposing first and second edges and opposing first and second ends, the  
hinge member also comprising a first curved slot located towards the second edge for  
receiving the first curved element of the first panel and a second curved slot located  
towards the first edge for receiving the second curved hinge element of the second  
panel; and

20 the hinge member also comprising a coupling portion at at least one of  
the first and second ends, the retainer configured to be coupled in one of the coupling  
portions so as to retain the curved hinge elements of the panels in respective first and  
second curved slots of the hinge member.

25 [Figure 1]