A connector for connecting panels includes a center and a plurality of fingers that are joined by the center that extend away from the center. Channels dimensioned to receive panels are defined between adjacent fingers. Fingers include generally planar surfaces for abutting engagement with generally planar surfaces of panels. An outer periphery of the connector being substantially circular or polygonal is interrupted by the channels. A structure includes panels connected edgewise by one or more connectors.
HUB AND SPOKE PANEL CONNECTOR

CROSS-REFERENCE TO RELATED APPLICATIONS


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BACKGROUND OF THE INVENTION

[0003] Generally planar panels are in common use for supporting and displaying graphical and text media presentations and as elements in multi-panel structures that can be assembled on location at a point of interest. Truss systems having beams and joints are available as framework structures for supporting such planar panels. Such truss systems add to the overall burden of transporting the materials for such a structure and typically require some level of experience and skill for erecting a stable structure of panels. For example, a traveling business representative attending a trade show might be able to carry a set of foam board panels (for displaying promotional material) in a briefcase as carry-on luggage on an airline flight or have the panels transported by postal or courier service in an envelope. A typical truss system (for constructing a display structure of the panels) would not likely be so conveniently carried or transported.

SUMMARY OF THE INVENTION

[0004] The present invention includes many aspects and features. Moreover, while many aspects and features relate to connectors for multi-panel structures, the present invention is not limited to use only in foam board panel displays, as will become apparent from the following summaries and detailed descriptions of aspects, features, and one or more embodiments of the present invention.

[0005] Accordingly, one aspect of the present invention relates to a connector for connecting panels. An exemplary such connector includes a center and a plurality of fingers that are joined by the center and that extend away from the center. Furthermore, in this aspect of the invention, each pair of adjacent fingers defines a channel dimensioned to receive a panel between generally planar surfaces of the adjacent fingers.

[0006] In a particular variation of this aspect of the invention, the center and fingers of a connector define a sunburst configuration. In another, the fingers of a connector are uniformly spaced about the center. In yet another, distal edges of fingers of a connector define an overall substantially circular outer periphery interrupted by channels.

[0007] Another aspect of the invention relates to a connector that includes a hub and a plurality of spokes members joined by the hub such that channels are defined between adjacent spoke members. The channels are dimensioned to receive panels between generally planar surfaces of adjacent spoke members.

[0008] In one or more connectors exemplifying this aspect, edges of the spoke members distal the hub define a connector outer periphery that is interrupted by channels. In a particular variation of this aspect, arcuate distal edges of spoke members define an overall substantially circular outer periphery. In one or more other variations, distal edges of spoke members define an overall substantially polygonal outer periphery interrupted by channels. Exemplary polygonal outer peripheries include at least pentagonal, hexagonal, heptagonal, and octagonal peripheries.

[0009] Yet another aspect of the invention relates to a circular disk having a circumference and multiple channels extending radially from an inner hub to the circumference. Each such channel has a longitudinal extent that is substantially straight and that is dimensioned to receive a panel that is disposed orthogonally to a plane of the circular disk.

[0010] Still another aspect of the invention relates to a structure of panels and one or more connectors each having a hub and a plurality of spoke members defining channels therebetween. In an example of this aspect, uninterrupted edges of panels are received in channels of the connectors and the panels are thereby connected together edgewise by the connectors. Optionally, informational content is displayed on a surface of a panel of a structure.

[0011] In addition to the aforementioned aspects and features of the present invention, it should be noted that the present invention further includes the various possible combinations of such aspects and features. Examples of such combinations are illustrated in the detailed description set forth below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] One or more embodiments of the present invention will now be described in detail with reference to the accompanying drawings, wherein the same elements are referred to with the same reference numerals, and wherein:

[0013] FIG. 1 is a plan view of a preferred embodiment of a connector in accordance with one or more aspects of the present invention;

[0014] FIG. 2 is a side view of the connector of FIG. 1;

[0015] FIG. 3 shows panels connected together by way of connectors in accordance with one or more aspects of the present invention;

[0016] FIG. 4 is a plan view of an embodiment of an octagonal connector in accordance with one or more aspects of the present invention;

[0017] FIG. 5 is a plan view of an embodiment of a pentagonal connector in accordance with one or more aspects of the present invention;

[0018] FIG. 6 is a plan view of an embodiment of a hexagonal connector in accordance with one or more aspects of the present invention;
[0019] FIG. 7 is a plan view of an embodiment of a heptagonal connector in accordance with one or more aspects of the present invention;

[0020] FIG. 8 is a plan view of another embodiment of a hexagonal connector in accordance with one or more aspects of the present invention;

[0021] FIG. 9 is a plan view of another embodiment of a heptagonal connector in accordance with one or more aspects of the present invention;

[0022] FIG. 10 shows an embodiment of a structure of panels according to one or more aspects of the present invention;

[0023] FIG. 11 shows another embodiment of a structure of panels according to one or more aspects of the present invention; and

[0024] FIG. 12 shows another embodiment of a structure of panels according to one or more aspects of the present invention.

DETAILED DESCRIPTION

[0025] As a preliminary matter, it will readily be understood by one having ordinary skill in the relevant art ("Ordinary Artisan") that the present invention is susceptible of broad utility and application. Furthermore, any embodiment discussed and identified as being "preferred" is considered to be part of a best mode contemplated for carrying out the present invention. Other embodiments also may be discussed for additional illustrative purposes in providing a full and enabling disclosure of the present invention. Moreover, many embodiments, such as adaptations, variations, modifications, and equivalent arrangements, will be implicitly disclosed by the embodiments described herein and fall within the scope of the present invention.

[0026] Accordingly, while the present invention is described herein in detail in relation to one or more embodiments, it is to be understood that this disclosure is illustrative and exemplary of the present invention, and is made merely for the purposes of providing a full and enabling disclosure of the present invention. The detailed disclosure herein of one or more embodiments is not intended, nor is it to be construed, to limit the scope of patent protection afforded the present invention, which scope is to be defined by the claims and the equivalents thereof. It is not intended that the scope of patent protection afforded the present invention be defined by reading into any claim a limitation found herein that does not expressly appear in the claim itself.

[0027] Thus, for example, any sequence(s) and/or temporal order of steps of various processes or methods that are described herein are illustrative and not restrictive. Accordingly, it should be understood that, although steps of various processes or methods may be shown and described as being in a sequence or temporal order, the steps of any such processes or methods are not limited to being carried out in any particular sequence or order, absent a clear indication otherwise. Indeed, the steps in such processes or methods generally may be carried out in various different sequences and orders while still falling within the scope of the present invention. Accordingly, it is intended that the scope of patent protection afforded the present invention is to be defined by the appended claims rather than the description set forth herein.

[0028] Additionally, it is important to note that each term used herein refers to that which the Ordinary Artisan would understand such term to mean based on the contextual use of such term herein. To the extent that the meaning of a term used herein—as understood by the Ordinary Artisan based on the contextual use of such term—differs in any way from any particular dictionary definition of such term, it is intended that the meaning of the term as understood by the Ordinary Artisan should prevail.

[0029] Furthermore, it is important to note that, as used herein, "a" and "an" each generally denotes "at least one," but does not exclude a plurality unless the contextual use dictates otherwise. Thus, reference to "a picnic basket having an apple" describes "a picnic basket having at least one apple" as well as "a picnic basket having apples." In contrast, reference to "a picnic basket having a single apple" describes "a picnic basket having only one apple."

[0030] When used herein to join a list of items, "or" denotes "at least one of the items," but does not exclude a plurality of items of the list. Thus, reference to "a picnic basket having cheese or crackers" describes "a picnic basket having cheese without crackers," "a picnic basket having crackers without cheese," and "a picnic basket having both cheese and crackers." Finally, when used herein to join a list of items, "and" denotes "all of the items of the list." Thus, reference to "a picnic basket having cheese and crackers" describes "a picnic basket having cheese, wherein the picnic basket further has crackers," as well as describes "a picnic basket having crackers, wherein the picnic basket further has cheese."

[0031] Turning now to FIGS. 1-3, a preferred embodiment of a connector 10 for connecting panels comprises a plurality of fingers such as spoke members 12 that are joined by a center such as hub 14 such that each spoke member extends away from the hub. Furthermore, in this particular embodiment, the hub 14 and spoke members 12 of the connector 10 define a sunburst configuration.

[0032] Channels 16 are defined between adjacent spoke members and are dimensioned for receiving panels. In particular, eight substantially mutually identical spoke members uniformly spaced about the hub define eight substantially mutually identical channels radially extending from the hub (i.e., extend along lines that generally intersect the geometric center of the connector).

[0033] Each channel has a longitudinal extent 24 (FIG. 1) that is substantially straight, and is dimensioned to receive a panel disposed orthogonally to the plane of the connector 10. In this respect, each spoke member 12 comprises a lobe 32 having a proximal end 34 attached to the hub and a distal end 36 being broader than the proximal end, and each lobe of an adjacent pair of lobes in this embodiment broadens with increasing distance from the hub whereby the channel defined between the pair has a uniform width along a substantial length or longitudinal extent 24. Moreover, as will be appreciated, the opposing generally planar surfaces 18 of an adjacent pair of spoke members are provided thereby to abut and engage generally planar surfaces of a panel when received within the channel.

[0034] In order to securely retain a panel within a channel, the longitudinal extent 24 of the channel has a generally uniform width 25 that is slightly less than the thickness 26
of a panel received therein, and spoke members 12 are substantially rigid and inflexible. An area of the panel received within a channel is thereby compressed by the surfaces 18 of the spoke members defining the channel, and the panel and connector are thereby frictionally engaged and retained together. Additionally, generally planar surfaces 18 may be provided with subtle texture to facilitate gripping of panel materials.

[0035] Corners 28 of the spoke members 12 are broken, rounded, or chamfered to ease and guide the receiving of panels into channels generally preserving the conditions of the surfaces and edges of panels. Repeatable capturing and releasing of a panel by a connector is thereby provided and a structure of panels and connectors can be repeatedly assembled and disassembled without undue destruction of the panels.

[0036] In FIG. 3, each of first panel 20 and second panel 30 are received in respective channels of the connector 10 along respective uninterrupted edges 22, 32 thereof, and are each thereby connected together by way of the connector 10 in a fixed angular relationship. A variety of angular relationships is available according to the relative arrangement of the channels of the connector.

[0037] The exemplary panel 20 of FIG. 3 is constructed of foam board, also known as foam core, which is a lightweight panel material having a planar inner core of a porous polystyrene material with exterior paper coating or exterior laminated plastic sheet. Paper coatings are available having various colors and various surface textures such as smooth and matte. Foam board type panels are readily available in thicknesses (each as a fraction of one inch) of 1/8, 1/4, 3/16, and 5/16. It should be clear that many types of panels and planar materials are commonly available, are constructed of various materials, and have various thicknesses. Accordingly, the connector 10, within the scope of the present invention, can be dimensioned to receive and retain essentially any type of panel or planar material. Furthermore, the connector is useful to retain and join objects, materials, and constructs that are not generally planar but that have extensions that can be received in a channel of the connector.

[0038] In yet another characteristic of this particular embodiment, arcuate distal edges 38 of the spoke members define an overall substantially circular outer periphery that is interrupted by channels 16.

[0039] In the particular embodiment of the connector 10 of FIGS. 1-3, optional opening 42 is provided that extends generally axially through the center of the hub 14 such that the hub comprises a circular annulus radially defined between the opening 42 and proximal ends of spoke members 12. Also, optional openings 44 are provided that extend generally axially through spoke members 12. These optional openings 42, 44 are discussed in the following with reference to FIG. 11.

[0040] Further more, the connector 10 of FIG. 1 is optionally provided as a unitary construction wherein the hub 14 and spoke members 12 are integrally formed of a plastic material though it should be apparent that other optional constructions of other optional materials are represented by the connector 10. Also, any area of the connector 10 optionally includes thereon indicia (not illustrated) such as printed material or graphic images for promotional or informational purposes.

[0041] While in FIGS. 1-3, the illustrated embodiment of the connector 10 appears as a generally circular disk having a circumference and multiple channels extending radially from an inner hub to the circumference, in other embodiments as illustrated in FIGS. 4-7, spoke members of connectors have various polygonal outer peripheries interrupted by channels that are defined between pairs of spoke members.

[0042] For example in FIG. 4, a total of eight spoke members 60a, 60b of the connector 62 include distal edges 64a, 64b that define an overall substantially octagonal outer periphery interrupted by a total of eight channels 66a, 66b. In another example shown in FIG. 5, five spoke members 70 of the connector 72 include distal edges 74 that define an overall substantially pentagonal outer periphery interrupted by five channels 76. In yet another example shown in FIG. 6, six uniformly spaced spoke members 80 of the connector 82 include distal edges 84 that define an overall substantially hexagonal outer periphery interrupted by six channels 86. In another example shown in FIG. 7, seven uniformly spaced spoke members 90 of the connector 92 include distal edges 94 that define an overall substantially heptagonal outer periphery interrupted by seven channels 96. Note that in each of these examples, the number of sides of the polygonal periphery is the same as the number of spoke members and channels.

[0043] With further regard to FIG. 4, note that channels 66a are each of a first width for receiving a panel that has a first thickness and that channels 66b are each of a second width for receiving a panel that has a second thickness that is different from the first thickness, whereby panels of different thicknesses are joinable together by the connector 62. In this example, the channels 66b are of a greater width than channels 66a.

[0044] Further embodiments of polygonal connectors are shown in FIGS. 8-9. For example, in FIG. 8, seven spoke members 100a, 100b, 100c, 100d of the connector 102 include distal edges 104a, 104b, 104c, 104d respectively that define an overall substantially hexagonal outer periphery interrupted by seven channels 106a, 106b, 106c, 106d. In FIG. 9, four spoke members 110a, 110b, 110c, 110d of the connector 112 include distal edges 114a, 114b, 114c, 114d respectively that define an overall substantially heptagonal outer periphery interrupted by four channels 116a, 116b, 116c, 116d.

[0045] It should be noted that in the particular embodiments of the connector illustrated in FIGS. 1 and 4-7, the channels—each of which is defined by a pair of spoke members—extend radially from the hub, whereas in the particular embodiments of the connector illustrated in FIGS. 8 and 9, not all channels defined between the spoke members extend in a radial direction. It should furthermore be noted that, like the channels of the particular embodiment of the connector as shown in FIG. 4, the channels of the particular embodiment of the connector as shown in FIG. 8, for example channels 106b and 106c, have different dimensions for receiving panels of different thickness. Finally, it should be noted that, in each of these embodiments of the connectors of FIGS. 8 and 9, the number of sides of the polygonal periphery is different from the number of spoke members.

[0046] In FIGS. 10, 11, 12 structures are shown wherein panels are connected together by connectors. Uninterrupted
edges of the panels are received within channels of the connectors and the panels are thereby connected together edgewise by the connectors.

[0047] Particularly in FIG. 10, a structure 120 for displaying informational content includes three panels, two panels 122, 124 of which extend from the structure as legs or bases for supporting the structure, and one panel 126 of which is held vertically held by a series of coaxially arranged connectors 128, 130. Informational content in the form of an area 132 of graphical images and portions of printed text 134, 136 are displayed on the surface 138 of the panel 126. This particular structure exemplifies a freestanding or table-top structure of panels for displaying informational content and has many potential uses. For example, the structure might be useful in an informational display at a school or in a science fair presentation. It might be used at a place of business or at a trade show to promote products or services. It might be used in a building lobby to direct visitors to respective destinations. It might be used to display images and descriptions of menu items of a restaurant. Furthermore, it might be used to inform shoppers that a nearby area of a floor is wet and caution in traversing the area should be taken.

[0048] A structure 150 of panels is shown in FIG. 11. Exemplary uses for this structure include, among other things, utilization as a multi-panel display for presentation of information on a table top. Connectors 152, 154 are coaxially arranged as a series about an axis passing through axial openings 42 of the hubs 14 of the connectors (see also FIG. 1). An elongate member 156 such as an inflexible rod, dowel, or axle extends through the openings of the hubs and supports a display element 158 illustrated as a flag or banner. Another elongate member 160 such as a flexible wire filament or piano wire passes through openings 44 of the spoke members 12 (see also FIG. 1) of the connectors 162, 164 and supports a pendant 166. Each flag or banner 158, 168 and pendant 166 are optionally colorized and each optionally have thereon indicia or information.

[0049] A columnar structure 170 of panels is shown in FIG. 12. This structure comprises a three-dimensional arrangement of panels that partially encloses an internal air space. Exemplary uses for this structure include, among other things, utilization as a kiosk, utilization to mark a point of interest or gathering point for people attending a social or business function, utilization as a full structure to display promotional material towering above nearby obstacles that would block visibility of a lower structure.

What is claimed is:
1. A connector for connecting panels comprising:
   (a) a center, and
   (b) a plurality of fingers joined by said center, each of said fingers extending away from said center,
   (c) wherein each pair of adjacent fingers defines there between a channel dimensioned to receive a panel, each said finger of said pair including a generally planar surface for abutting engagement with a generally planar surface of a panel when received within said channel of said pair.
   2. The connector of claim 1, wherein said adjacent pairs of said fingers define other than four of said channels.
3. The connector of claim 1, wherein said center and said fingers define a sunburst configuration.
4. The connector of claim 1, wherein said connector consists of said center and eight of said fingers uniformly spaced about said center to define eight channels between adjacent said fingers.
5. The connector of claim 1, wherein an opening extends generally axially through said center.
6. The connector of claim 1, wherein an opening extends generally axially through at least one said finger.
7. The connector of claim 1, wherein each said finger comprises a lobe having a proximal end attached to the center and a distal end, said distal end being broader than said proximal end.
8. The connector of claim 1, wherein said fingers each includes an arcuate distal edge, and wherein said distal edges of said fingers define an overall substantially circular outer periphery of said connector, said circular outer periphery being interrupted by said channels.
9. A connector for connecting panels comprising:
   (a) a hub, and
   (b) a plurality of spoke members joined by said hub, each of said spoke members extending away from said hub,
   (c) wherein each pair of adjacent spoke members defines there between a channel dimensioned to receive a panel, each said spoke member of said pair including a generally planar surface for abutting engagement with a generally planar surface of a panel when received within said channel of said pair.
10. The connector of claim 9, wherein a channel defined by a said pair of adjacent spoke members extends in a non-radial direction with respect to a center of said hub.
11. The connector of claim 9, wherein said adjacent pairs of said spoke members define other than four of said channels.
12. A connector of claim 9, wherein said spoke members are substantially rigid and inflexible.
13. The connector of claim 9, wherein said connector is substantially planar, wherein a first channel is dimensioned to receive a first panel when orthogonally disposed to a plane of said connector and a second channel is dimensioned to receive a second panel when orthogonally disposed to the plane of said connector.
14. The connector of claim 9, wherein said spoke members are substantially identical in shape.
15. The connector of claim 9, wherein said spoke members are uniformly spaced about said hub.
16. The connector of claim 9, wherein each said spoke member comprises a lobe having a proximal end attached to the hub and a distal end, said distal end being broader than said proximal end.
17. The connector of claim 16, wherein each lobe of a said pair of adjacent lobes broadens with increasing distance from said hub such that said channel defined there between has a uniform width along a substantial length thereof.
18. The connector of claim 9, wherein said generally planar surfaces of a said pair of spoke members oppose one another for abutting engagement directly there between of a panel received within said channel of said pair.
19. The connector of claim 9, wherein said spoke members each includes an arcuate distal edge, and wherein said distal edges of said spoke members define an overall sub-
stantially circular outer periphery of said connector, said circular outer periphery being interrupted by said channels.

20. The connector of claim 9, wherein said spoke members each includes a distal edge, and wherein said distal edges of said spoke members define an overall substantially polygonal outer periphery of said connector, said polygonal outer periphery being interrupted by said channels.

21. The connector of claim 20, wherein the number of sides of said polygonal outer periphery is the same as the number of said spoke members of said connector.

22. The connector of claim 20, wherein the number of sides of said polygonal outer periphery is different from the number of said spoke members of said connector.

23. The connector of claim 20, wherein said polygonal outer periphery is pentagonal.

24. The connector of claim 20, wherein said polygonal outer periphery is hexagonal.

25. The connector of claim 20, wherein said polygonal outer periphery is heptagonal.

26. The connector of claim 20, wherein said polygonal outer periphery is octagonal.

27. The connector of claim 9, wherein said hub and said spoke members are integrally formed.

28. The connector of claim 9, wherein said connector consists of said hub and eight of said spoke members uniformly spaced about said hub to define eight channels between adjacent said spoke members.

29. The connector of claim 9, wherein said members are mutually identical in configuration and said channels are mutually identical in configuration.

30. The connector of claim 9, wherein said connector consists of said hub and five of said spoke members uniformly spaced about said hub to define five channels between adjacent said spoke members.

31. The connector of claim 9, wherein said connector consists of said hub and six of said spoke members uniformly spaced about said hub to define six channels between adjacent said spoke members.

32. The connector of claim 9, wherein said connector consists of said hub and seven of said spoke members uniformly spaced about said hub to define seven channels between adjacent said spoke members.

33. The connector of claim 9, wherein each said channel is substantially linear in extent and has a uniform width along such extent.

34. The connector of claim 9, wherein an opening extends generally axially through said hub.

35. The connector of claim 9, wherein an opening extends generally axially through at least one spoke member.

36. The connector of claim 9, wherein said hub comprises a circular annulus having an opening extending generally axially through, wherein said spoke members extend radially from an outer circular edge of said annulus, and wherein outer edges of said spoke members define a substantially circular outer periphery of said connector, said circular outer periphery being interrupted by said channels.

37. A connector for receiving and retaining one or more panels, the connector comprising,

(a) a circular disk having a circumference, and

(b) multiple channels extending through said circular disk, each said channel extending radially from an inner hub of said circular disk to said circumference,

(c) wherein each said channel has at least a longitudinal extent thereof that is substantially straight and that is dimensioned to receive a panel disposed orthogonally to a plane of said circular disk.

38. The connector of claim 37, wherein each said channel has a generally uniform width along said longitudinal extent for abutting engagement with a panel when received therein.

39. An apparatus comprising a structure, said structure comprising,

(a) a plurality of panels; and

(b) one or more connectors connecting together said panels, each said connector comprising,

(i) a hub, and

(ii) a plurality of spoke members joined by said hub, each of said spoke members extending away from said hub,

(iii) wherein,

(A) a first pair of adjacent spoke members of said connector defines there between a channel in which is received one of said panels, each said spoke member of said first pair including a generally planar surface disposed in abutting engagement with a generally planar surface of said one panel received within said channel of said first pair, and

(B) a second pair of adjacent spoke members of said connector defines there between a channel in which is received another of said panels, each said spoke member of said second pair including a generally planar surface disposed in abutting engagement with a generally planar surface of said other panel received within said channel of said second pair.

40. The apparatus of claim 39, wherein each said panel includes an uninterrupted edge and wherein each said panel is received within a said channel of a said connector along said uninterrupted edge.

41. The apparatus of claim 39, wherein each said panel of said structure is connected edgewise to another said panel of said structure by a said connector.

42. The apparatus of claim 39, wherein a said panel includes media printed on a surface thereof for display.

43. The apparatus of claim 39, wherein at least one of said panels displays informational content on a surface thereof.

44. The apparatus of claim 39, wherein a portion of each said panel that is received within a said channel of a said connector is compressed by a said pair of spoke members defining said channel.

45. The apparatus of claim 39, wherein said connector has a substantially circular outer periphery that is interrupted by said channels.

46. The apparatus of claim 39, wherein a series of said connectors of said structure is coaxially arranged about an axis, wherein each hub of each said connector of said series includes an axial opening extending there through along the axis, and wherein an elongate member extends through each said axial opening of each said connector of said series.

47. The apparatus of claim 39, wherein a series of said connectors of said structure is coaxially arranged about an axis, wherein a spoke member of each said connector of said series includes an axial opening extending there through.
parallel to the axis, and wherein an elongate member extends through each said axial opening of each said connector of said series.

48. The apparatus of claim 39, wherein said structure comprises a three-dimensional arrangement of said panels.

49. The apparatus of claim 39, wherein said structure comprises an enclosure of panels.

50. The apparatus of claim 39, wherein one of said channels of a said connector receives a said panel which has a first thickness, and wherein another of said channels of said connector receives another said panel which has a second thickness different from said first thickness, whereby panels of differing thicknesses are joined together by said connector of said structure.

51. The apparatus of claim 39, wherein said channels in which are received said panels are dimensioned such that a longitudinal extent of each said channel has a uniform width that is slightly less than a thickness of said respective panel received therein.

52. The apparatus of claim 39, wherein an area of said panel received within a said channel is compressed by said generally planar surfaces of said spoke members defining said channel.

53. The apparatus of claim 39, wherein said generally planar surfaces of said spoke members oppose one another.

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