Aug. 13, 1957 C. B. FRITSCHE 2,802,478

SHELTER CONSTRUCTION

Filed April 21, 1954 2 Sheets-Sheet 1

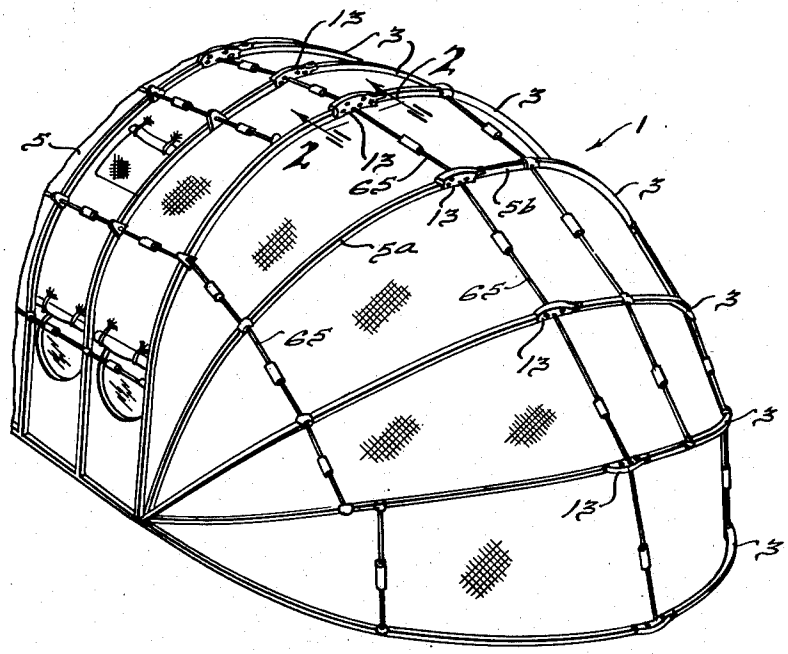


FIG. 1.

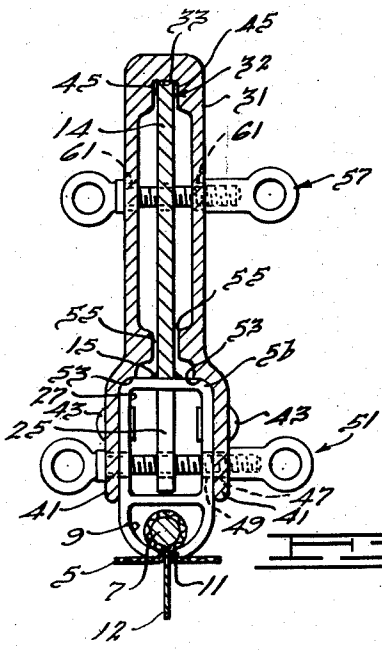


FIG. 4.

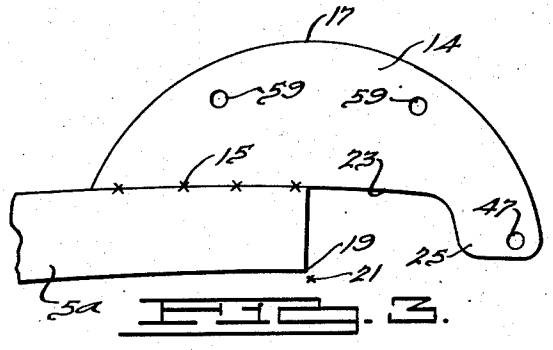


FIG. 3.

INVENTOR.
Carl B. Fritsche.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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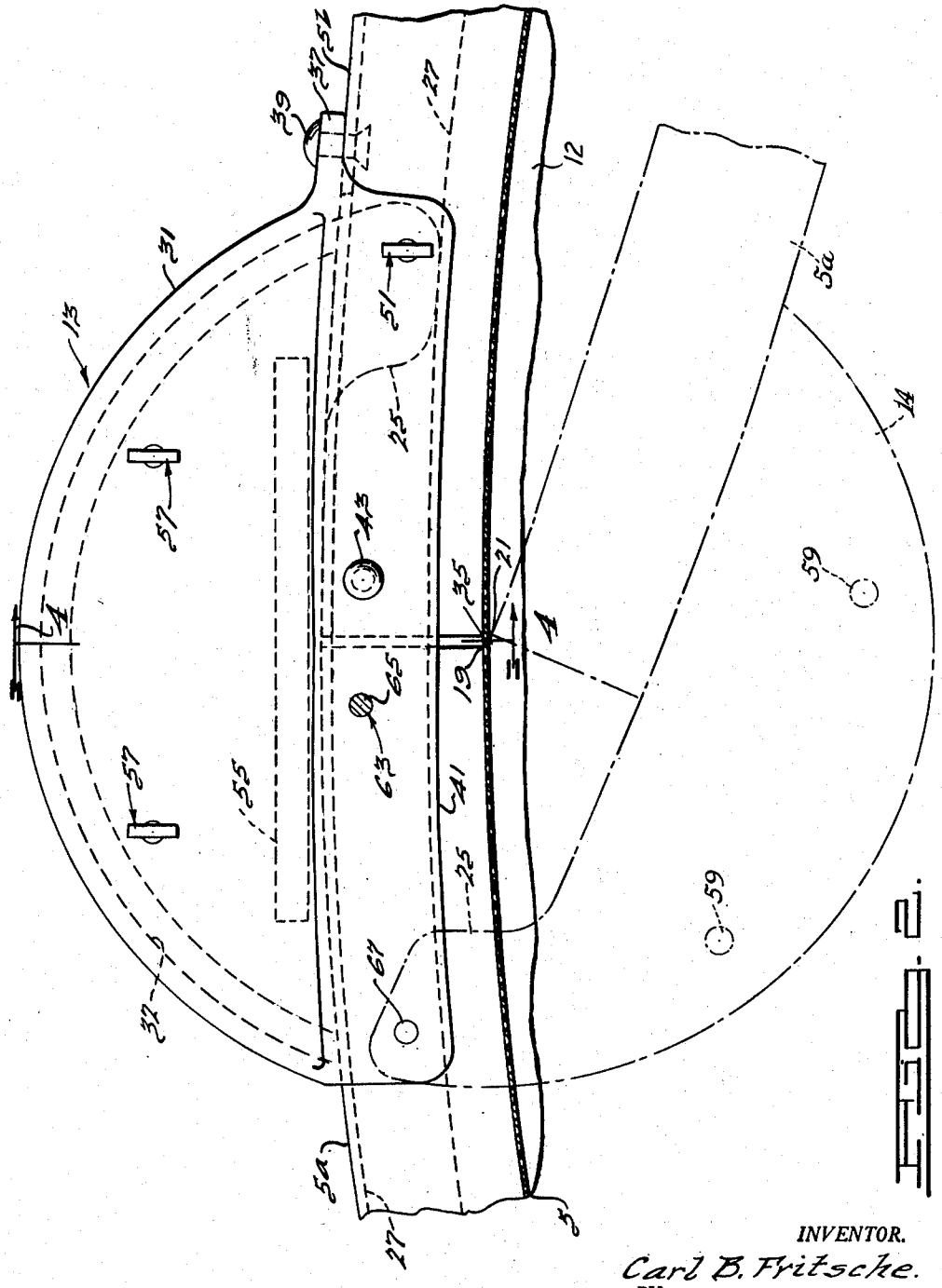


Fig. 2.

INVENTOR.
Carl B. Fritsche.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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2,802,478

SHELTER CONSTRUCTION

Carl B. Fritsche, Fairfax County, Va.

Application April 21, 1954, Serial No. 424,661

3 Claims. (Cl. 135—1)

This invention relates to collapsible shelters and tents of the type disclosed in my copending applications, Serial No. 293,784, filed June 16, 1952, and Serial No. 378,065, filed September 2, 1953.

Shelters of the type with which my invention is particularly concerned have a rigid but collapsible skeleton framework which supports walls of flexible material such as canvas. I provide a continuous connection between the flexible material and certain of the frame members and I desire to preserve this connection when the shelter is collapsed to render it capable of compact and ready transportation from one point to another. In order to permit this and at the same time furnish great rigidity and strength so that my shelter in the erected condition will be capable of withstanding heavy wind loads, I have provided by means of the present construction a hinge construction of rather simple design but optimum functional characteristics.

According to the present invention, I provide a hinge plate on one frame member and a body or housing for the plate on a frame member which is to be hinged to the first. The hinge construction as defined by the plate and the body are in contact along a circular path and along planes radial to said path.

Engagement along the circular path provides for pivotal or hinging movement about the axis of the path while engagement in radial planes insures proper alignment of the connected frame members relative to each other.

At the present time this hinge construction is intended primarily for use on the arch frame members that are the main structural elements in the preferred forms of my shelter and they are placed on the convex side (i. e. outside) of the arch, the fabric wall being suspended from the concave side (i. e. inside) of the arch. This arrangement not only avoids interference of the hinge with the fabric wall but locates it in a position in which it can readily prevent the arch sections from following their tendency to straighten out or turn inside out when the shelter is subjected to heavy winds.

My invention is shown in its preferred form in the accompanying drawing in which:

Figure 1 is a perspective view of a part of a shelter constructed in accordance with the teachings of this invention and the inventions shown in the aforesaid copending applications;

Fig. 2 is an enlarged side elevation with parts broken away of the hinge construction of this invention;

Fig. 3 is a side elevation of the subassembly of hinge plate and arch sections; and

Fig. 4 is a cross section taken along the line 4—4 of Fig. 2.

As described in much more detail in my copending applications, the collapsible and portable shelter **1** includes a series of parallel longitudinally spaced vertical arch members **3** that are preferably of about semicircular shape. Suspended from the bottom faces of the arch members is the fabric wall **5** of the tent. The wall **5**, which may be of canvas or other suitable material, has

an enlarged welt **7** which extends across the entire width of the shelter and is entirely confined within a recess **9** in the bottom of each arch **3**. The recess **9** has a narrow neck or slot **11** which opens out of the bottom of the arch and the canvas extends out through the slot and longitudinally to the adjacent arches. If desired, a hanger tab **12** of flexible material may be secured to the canvas and suspended from the arches by means of the welt **7**. The welt **7** is threaded through the recess **9** so that it extends throughout the full length of each arch and it is desired to leave it within the recesses **9** when the arches are collapsed.

Each arch may be made of as many sections as desired. I prefer to make it in four sections of equal length and thus would provide a hinge at the top or 90° point of the arch as well as hinges at each 45° point. However, the number of sections depends largely on the erected size of the tent and on the collapsed size that it is desired to obtain. In order to simplify the drawing I have shown hinges at only the 90° point.

The details of the hinge construction which I prefer to use for attaching the various sections of an arch **3** together are shown best in Figs. 2–4, the hinge being designated generally by the reference number **13** and the two arch sections that are joined together by the reference numbers **5***a* and **5***b*. As seen in Fig. 3 the arch section **5***a* has a thin plate **14** welded or otherwise securely fixed to its top surface as shown at **15**. The plate **14** is a segment of a circle and its outer periphery **17** is formed on a radius from a center **21** that may be just slightly below and to the right of the bottom corner **19** of the arch section **5***a*. The chordal surface **23** which is welded or otherwise secured to the top of the section **5***a* will be slightly arcuate and on the same radius as the curved arch so as to insure a close fit. Inasmuch as the center or curvature of the arch and thus of the surface **23** is on the ground for a semicircular arch the surfaces appear substantially flat in the drawing due to the reduction in size. The plate **14** has a tail portion **25** which will project through a slot formed in the top of the adjacent section **5***b*, the tail **25** thus being accepted by the enlarged hollow interior **27** of the arch member **3**.

The arch member section **5***b* is securely attached to a hinge body or housing **31** that may be curved on a radius extending from the center **21**. The body **31** has an interior slot **32** with a circular bearing surface **33** adapted for sliding engagement with the periphery **17** of the plate **14**. The arch section **5***b* may be attached to the body **31** so that its lower corner **35** is slightly above and to the right of the center **21**, the ends of the sections **5***a* and **5***b* thus being slightly spaced apart to provide for expansion due to temperature changes. Attachment of the body **31** to the section **5***b* may be accomplished by various means and I have shown an ear **37** formed to extend in a direction outward from the body **31** to rest on the top of the section **5***b* to which it is secured by a blind rivet **39** extending through the ear and the top of the section **5***b*. The channel **5***b* fits between spaced bottom sides **41** of the housing **31** and may be attached near its end to each of the sides by means of blind rivets **43** extending through suitable holes in the section **5***b* and the body **31**.

In connecting arch sections **5***a* and **5***b* together, the hinge plate **14** may be inserted into the body **31** by sliding it, tail **25** first, into the bottom left-hand end of the body **31**. The plate **14** will ride on the radial walls **45** of the slot **32** and the tail will follow the slot around until it enters the aforementioned slot in the top of arch member **5***b* and the hole **47** in the tail **25** is aligned with a hole **49** in both side walls **41** of the body **31**. An eye bolt and nut assembly **51** may then be projected through the aligned holes **47** and **49** and tightened up to fix the relative

angular positions of the hinge plate **14** and the body **31**. When the hinge plate is in the position just mentioned, both arch sections **5***a* and **5***b* will be housed between the side walls **41** as previously indicated and the tops thereof will engage shoulders **53** within the body **31** as well as the sides **41** of the body **31**. The plate **14** can engage transverse ribs **55** within the housing **31** as well as walls **45**, so that ample support is provided to prevent misalignment of the arch sections. Additional rigidity acting to prevent relative angular movement of the sections **5***a* and **5***b* may be provided by projecting eye bolt assemblies **57** through holes **59** in the plate **14** which will be aligned with holes **61** in opposite sides of the body **31**.

Holes **63** may be provided in the side walls **41** to receive the projection on the end of adjustable purlins **65** that may extend longitudinally between adjacent arch members **3** to rigidly unite them, the adjustable purlin structure being described in more detail in my copending application, Serial No. 378,065.

When it is desired to collapse an arch member 3, the eye bolt assemblies are removed and the arch sections **5***a* and **5***b* are folded toward each other. After about 180° of relative movement, the hole **47** will register with the holes **67** through the side walls **41** and an eye bolt assembly can be projected through the aligned holes to rigidly secure the hinge plate to the body with the members **5***a* and **5***b* in a collapsed condition.

It will be seen that there is a substantial area of radial engagement between the sides of the hinge plate and the body which will effectively prevent relative shifting of the two sections. Pivotal movement, such as might be occasioned by a tendency of the arch to turn inside out under shear loads, is positively prevented by means of the eye bolt assembly **51** and if extra strength is desired the assemblies **57** may also be used. It will also be noted that moving parts of the hinge **13** are well protected from the effects of severe weather by the casing **31**.

It will be recognized that various modifications of the structure described and illustrated are within the spirit and scope of the invention.

I claim:

1. In a collapsible shelter of the type described, a hollow arch member comprised of first and second aligned sections having means on the concave bottom side for receiving and supporting a flexible wall, a hinge plate secured along the convex top side of said first section and extending upwardly and about half of its length projecting out beyond the end of said section and the remote end thereof having a tail extending down, a hinge body secured along the convex top side of said second section and extending upwardly and about half of its length projecting out beyond the end of said second section, the top edge of said plate being substantially semicircular and slidably fitting in a substantially semicircular groove inside of said body, said tail extending through a slot in the top of said second section and having a hole therethrough registering with holes in said second section and in said body whereby bolt means may be passed through said holes to clamp said plate and body together against relative angular movement.

2. The invention set forth in claim 1 including registering holes in said plate and body located above said sections for receiving additional bolt means to clamp said plate and body together.

3. The invention set forth in claim 1 including holes in said body that align with the holes in said tail when said arch sections are folded a predetermined distance toward each other and said tail is out of the slot in the second section.

References Cited in the file of this patent

UNITED STATES PATENTS

1,761,901	Wickstrum	June 3, 1930
2,160,485	Obrecht	May 30, 1939
2,299,382	Creasy	Oct. 20, 1942
2,494,347	Matthews	Jan. 10, 1950
2,627,865	Mitchell et al.	Feb. 10, 1953