Sept. 30, 1969 O. M. RAINWATER 3,469,588

ARTICULATED MULTISECTION SHELTER OR FRAME STRUCTURE

Filed Sept. 14, 1967 2 Sheets-Sheet 1

FIG. 1.

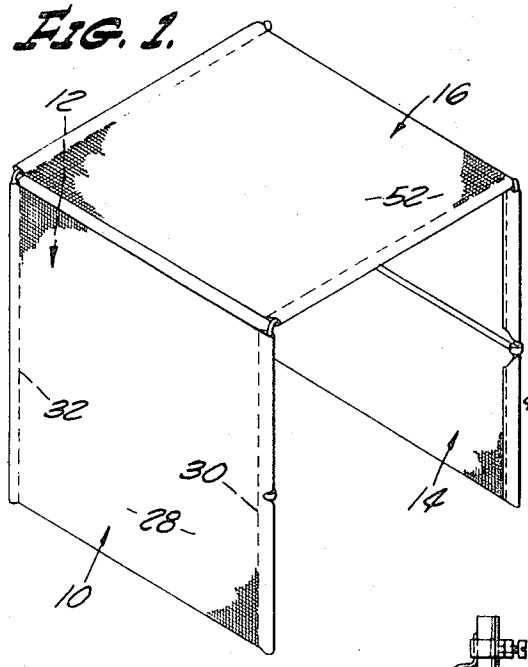


FIG. 2.

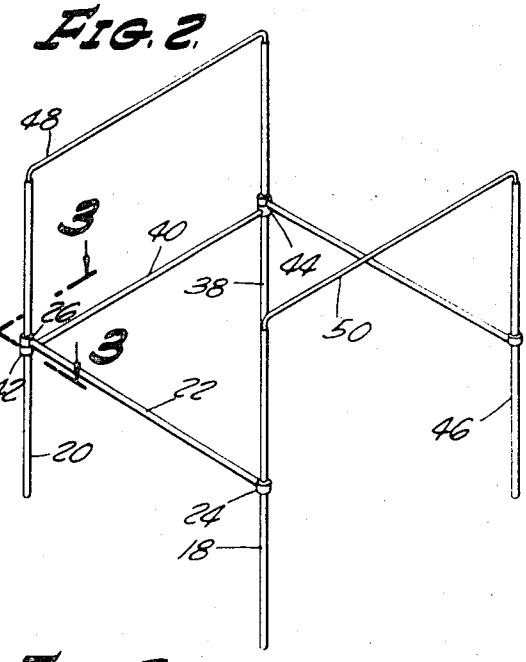


FIG. 7.

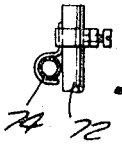


FIG. 3.

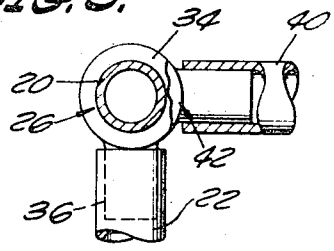


FIG. 4.

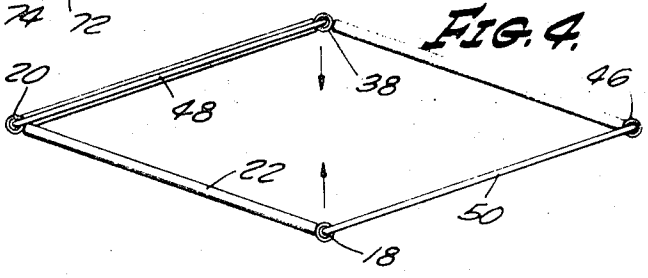
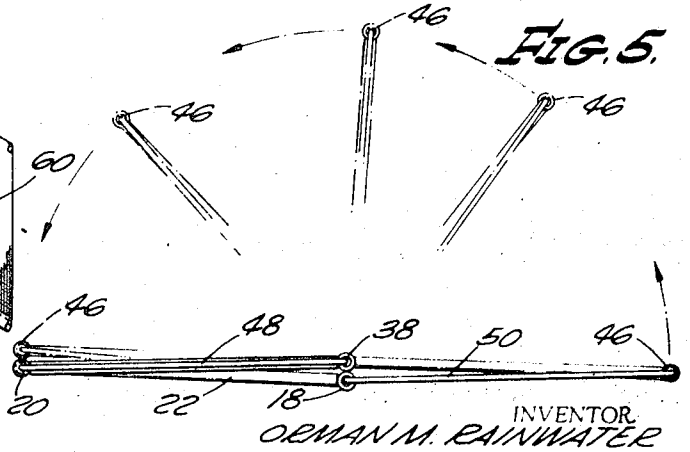


FIG. 5.



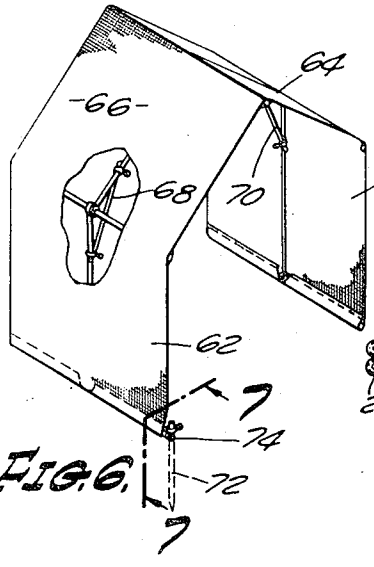


FIG. 6.

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FIG. 8.

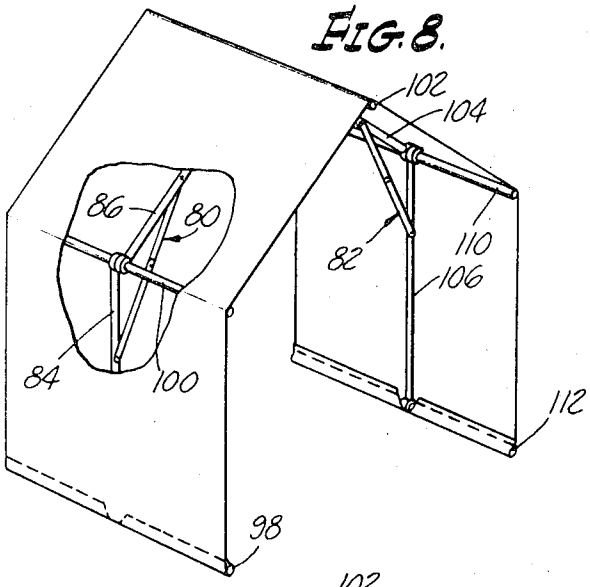


FIG. 11.

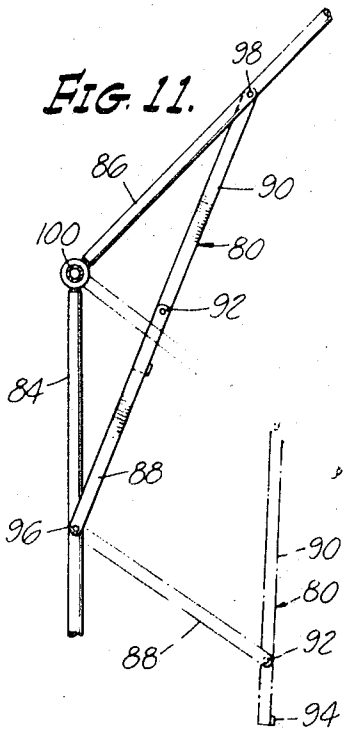


FIG. 9.

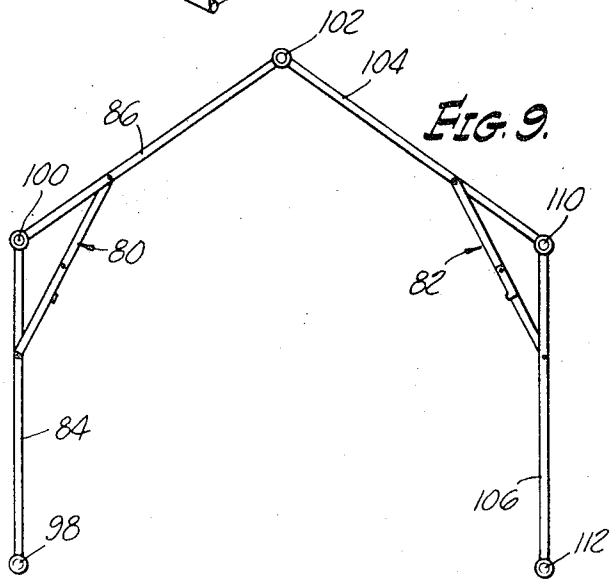


FIG. 12.

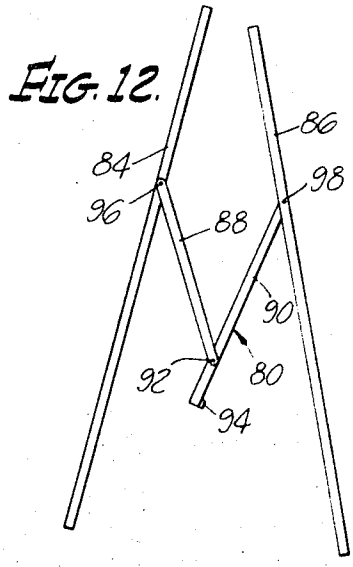
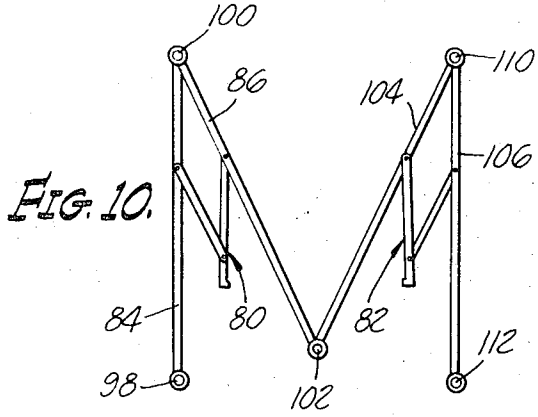


FIG. 10.



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3,469,588

ARTICULATED MULTISECTION SHELTER OR FRAME STRUCTURE

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Continuation-in-part of application Ser. No. 532,402, Mar. 7, 1966. This application Sept. 14, 1967, Ser. No. 667,799

Int. Cl. E04f *10/04*

U.S. Cl. 135—5 9 Claims

ABSTRACT OF THE DISCLOSURE

The portable shelter structure comprises a series of sections. Each section includes a flexible sheet of material **28**, a pair of rods **18** and **20**, seams **30** and **32** or other means attaching the rods in spaced parallel relationship to the flexible sheet when the sheet is taut. A single brace **22** having an effective link corresponding to the spacing between the rods when the sheet is taut, and swivel joints **24** and **26** or other means attachably connecting the brace **22** to intermediate portions of the rods **18** and **20**.

Related application

This is a continuation-in-part of application Ser. No. 532,402, filed Mar. 7, 1966, and now abandoned.

Brief summary of the invention

This invention relates to a portable shelter or enclosure generally of the type described in my prior U.S. Patent No. 3,227,111, issued Jan. 4, 1966.

The primary object of this invention is to provide a lightweight, knock-down unit comprising an articulated series of wall or frame sections capable of array in any one of a wide variety of shelter or enclosure forms. A companion object of this invention is to provide a series of wall or frame sections of this character capable of forming a tent, a beach dressing room, a shelter extension for a camper, etc.

Another object of this invention is to provide a device of this character that is easily assembled and easily stored.

In order to accomplish the foregoing objectives, I provide frame sections, each comprising a fabric sheet sewn along opposite edges to form sleeves for receiving supporting rods. The rods are held apart by a central brace, the ends of which are detachably connected to intermediate portions of the rods by swivel joints mounted on the rods. Each successive frame section utilizes one rod of the preceding frame section, a second swivel joint being provided on each intermediate rod. When the rods are arrayed horizontally, a tent, lean-to or other shelter may be formed. When the rods are arrayed vertically, a multiwalled enclosure or any desired configuration may be formed, and the upper ends of the rod may cooperate with frame elements of a detachable top.

Another object of this invention is to provide a multisection wall or frame structure of this character in which the swivel joints are held in position by the edges of access holes in the flexible sheet material through which the rods extend.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of several embodiments of the invention. For this purpose, there are shown a few forms in the drawings accompanying and forming part of the present specification, and which drawings, unless described as diagrammatic, are true scale. These forms will not be described in detail, illustrating the general principles of the invention; but it is to be understood that

this detailed description is not to be taken in a limiting sense.

Brief description of the drawings

FIGURE 1 is a pictorial view of a shelter incorporating the present invention.

FIG. 2 is a view similar to FIG. 1, but showing the frame without the covering.

FIG. 3 is an enlarged fragmentary sectional view taken along a plane corresponding to line **3**—**3** of FIG. 2.

FIGS. 4 and 5 are diagrammatic views illustrating how the shelter may be folded without removing braces.

FIG. 6 is a pictorial view showing a modified shelter incorporating the present invention.

FIG. 7 is an enlarged fragmentary sectional view taken along a plane corresponding to line **7**—**7** of FIG. 6.

FIG. 8 is a pictorial view of another modified shelter incorporating the present invention.

FIGS. 9 and 10 are front elevational views of the frame portion of the apparatus shown in FIG. 8, and indicating how the frame with the covering in place can be erected and folded.

FIG. 11 is an enlarged fragmentary view of the corner brace, the phantom-line position showing how the brace is moved when the shelter is knocked down.

FIG. 12 is an elevational view of a pair of main braces and a corner brace together comprising one of two frame units of the shelter.

Detailed description

The shelter shown in FIG. 1 comprises three serially connected wall sections **10**, **12** and **14** and a detachable top section **16**. The wall section **10** is made of two tubular rods **18** and **20**, a brace **22**, two swivel joints **24** and **26**, and a flexible fabric covering **28**.

The covering **28** is sewn along opposite edges, as at **30** and **32**, to form elongate sleeves for reception of the rods **18** and **20**, respectively. The brace **22**, made of tubular material, extends at right angles from the central part of one rod **18** to the central part of the opposite rod **20**, and is held in place by the swivel joints **24** and **26**. The swivel joints **24** and **26** are identical, and may be made of cast aluminum or the like. As shown in FIG. 3, the swivel comprises a central eye portion **34** having an aperture fitting the rod **20**, and a radial projection **36** designed to fit into the end of the brace **22**. The projection **36** extends through and beyond a cutout portion of the folded-over end of the fabric **28**, and accordingly is held in position carefully of the rod **20**.

The rods **18** and **20**, together with the swivel joints **24** and **26**, are in position with respect to the fabric material **28** when the structure is knocked down. The brace **22** is not in place; accordingly, the wall section comprising the rods **18** and **20** and the fabric covering **28** can be compactly rolled up.

To install the brace **22**, one end is positioned over the projection of one of the swivel joints. The other end of the brace can be positioned alongside the other swivel joint. In order to permit installation, the rod mounting the other swivel joint must be flexed sufficiently to permit the swivel projection to enter the other end of the brace. To facilitate such flexure, the swivel joint and the brace may be rotated slightly about the rods respectively mounting them until the end of the brace is accessible to the swivel projection; then the brace and the swivel can be rotated downwardly in unison, which causes requisite flexure until the brace and projection are aligned, whereupon the parts snap together. Optionally, the brace could be extensible.

The second wall section **12** comprises the rod **20**, a rod **38**, a brace **40**, two swivel joints **42** and **44**, and a flexible covering. This wall section is identical to the

wall section **10**, the rod **20** serving as a rod for the contiguous wall sections. The swivel joint **42** for the second section is placed adjacent the swivel joint **26** for the first wall section **10**. In all other respects, the wall section **12** is identical. Similarly, the wall section **14** is identical, the rod **38** for the second section serving as one rod for the third wall section cooperable with a rod **46**. The flexible coverings for the three sections may be cut from the same cloth.

In the present example, there are three wall sections each of square configuration, and arrayed vertically to form a three-sided shelter. The top **16** comprises two rods **48** and **50** accommodated in sleeves or pockets formed along opposite edges of the fabric covering **52**. The rods **48** and **50** are substantially U-shape, the ends of the rods being telescopically accommodated in the ends of the rods **18**, **20**, **38** and **46**. If desired, the rods **48** and **50** could be formed of material identical to the rods **18**, **20**, **38** and **46**, in which case simple angle connectors could be used.

The shelter is capable of being folded since the rods **18**, **20**, **38** and **46** are arrayed as axes of an equilateral quadrangle. Thus, as indicated in FIG. 4, the structure can be collapsed so that opposite rods **18** and **38** are brought together, and so that the structure can be further folded about the axes of the rods **18** and **38**, as indicated in FIG. 5. All this can be accomplished while the top is in position. Of course, in order to knock down the structure entirely, the braces are removed and the rods rolled up about the fabric elements.

The enclosure shown in FIG. 6 utilizes four wall sections identical to the wall sections described in the previous form. In this instance, the axes of the rods are horizontal, and the sections are arrayed to form a tent-like enclosure. Two sections **60** and **62** form side walls; two sections **64** and **66** form roof sections. Detachable struts or braces **68** and **70** hold the sections in proper angular relationship one with respect to the other. A stake **72** anchors the structures. The stake **72** is detachably connected to one of the rods **74** (FIG. 7) by a suitable clamping means. The fabric covering may be sewn to provide pockets for the end braces only or for all of the braces.

The enclosure shown in FIGS. 8 to 12 is similar to that shown in FIG. 6. In the present instance however, the corner braces **80** and **82** are foldable toggle links. Both braces are identical. The corner brace **80**, for instance, which joins the wall braces **84** and **86** has two arms **88** and **90** made of flat stock material. Corresponding first ends of the arms are overlapped and connected by a pin or rivet **92** to allow angular movement. An abutment **94**, carried by one of the arms **90**, forms a stop, limiting such angular movement. The other end of the arm **88** is pivotally connected to the wall brace **84** as by the aid of a pin or rivet **96**, and the other end of the companion arm **90** is pivotally connected to the wall or roof brace **86** as by a pin or rivet **98**.

The toggle brace **80**, being pivotally connected to main braces **84** and **86**, forms therewith a pre-assembled brace unit shown in FIG. 12. The toggle brace **82** similarly forms a unit with the main braces **104** and **106**. The units can be folded beyond the position shown in FIG. 12 so that the main braces and the toggle brace arms are all closely side by side. In order to install one of the units relative to the covering, one of the main braces **84** is first connected to the swivel joints carried by rods **98** and **100**. The companion brace **86** is then connected to a pair of swivel joints respectively mounted on the rod **100** and the rod **102**. The companion pre-assembled brace unit is similarly assembled.

Suitable means may be provided, such as the stake shown in FIGS. 6 and 7, to hold the side walls of the enclosure of FIG. 8 in a vertical position.

The various main braces and toggle braces can be folded with the fabric covering in place to and beyond

the position shown in FIG. 10 until the wall sections are essentially stacked together. Optionally, the brace units can be removed, whereupon the rods **98**, **100**, **102**, **110** and **112** can be rolled into a tight package. The folded brace units conveniently are wrapped in the package.

Except as described, the form shown in FIGS. 8 to 12 is the same as that shown in FIGS. 6 and 7.

The wall sections serially connected in the manner shown are capable of a wide variety of uses—as a beach dressing room, a series of inverted V-shaped enclosures for camping purposes, as a sheltered entrance to a trailer or camper, etc.

I claim:

1. A portable enclosure comprising a plurality of wall sections, each wall section comprising a pair of rods of circular cross-section, a fabric covering extending between adjacent rods and providing pockets for the rods, a pair of swivel joints respectively mounted at the central portions of the rods, and a brace; means carried by said swivel joints forming with the ends of said braces, couplings separable therefrom by longitudinal movement; the intermediate rods serving as one of the two rods for each of the two contiguous wall sections; each of the braces being of such size as to impose, when in place, a stress in the fabric acting parallel to the corresponding brace, said stress serving yieldingly to maintain said couplings in operable position.

2. The enclosure as set forth in claim **1** in which there are three wall sections, the distance between the rods of each wall section being the same whereby the wall sections may be arrayed as a square; and a top section having a pair of rods and a flexible covering, said rods being pivotally and detachably connected to corresponding ends of the rods of said wall sections, the effective length of the rods of said top section being the same as the said distance between said rods of said wall sections whereby said wall sections and said top section may be folded together with the top section in place.

3. The combination as set forth in claim **1** together with adjustable struts having ends respectively attached to the braces of adjoining wall sections for holding contiguous wall sections in a predetermined angularly fixed relationship.

4. The combination as set forth in claim **3** together with a stake cooperable with one of the rods for securing said wall sections.

5. In a portable shelter structure: a flexible sheet of material; a pair of straight rods; means attaching the rods at positions located to be in spaced parallel relationship to the flexible sheet when the sheet is taut whereby said two rods with the flexible sheet may be rolled together for shipment and storage and whereby the rods can be moved apart to hold the sheet taut; a single brace having an effective length corresponding to the spacing between the rods when the sheet is taut; and means for detachably connecting said brace to intermediate opposed portions of said rods; said rods being held apart only by said brace with tension of the fabric on opposite sides of the brace resisting opposite angular movement of the rods out of parallelism.

6. In a portable shelter structure: a flexible covering of material; three straight rods; means attaching the rods to the material at positions located to be substantially in spaced parallel relationship to the flexible material when the material is taut whereby said rods with the flexible material may be rolled together for shipment and storage and whereby the rods can be moved apart to hold the material taut; an individual separate brace unit including a pair of braces and a foldable toggle link having arms pivoted to each other and respectively to said braces, the braces being attached to each other only by said toggle link arms; said braces having effective lengths corresponding to the spacing between the corresponding rods when the material is taut; releasable means pivotally connecting corresponding adjacent ends of the braces to

the center rod for independent angular movement thereabout, said toggle link determining the limit of relative angular movement between said braces; and releasable means connecting the other corresponding ends of the braces respectively to the other rods.

7. In a portable shelter structure: a flexible covering material; five rods; means attaching the rods to the material at positions located to be substantially in spaced parallel relationship to the flexible material when the material is taut whereby said rods with the flexible material may be rolled together for shipment and storage and whereby the rods can be moved apart to hold the material taut to define successive shelter sections; a pair of brace units, one for the section of material between the first three rods including the middle rod, and one for the section of material between the second three rods also including the middle rod, each of said brace units including a pair of braces and a foldable toggle link having arms pivoted to each other and respectively to the braces of said pair; said braces having effective lengths corresponding to the spacing between the corresponding rods when the material is taut; means detachably and pivotally connecting corresponding ends of the braces of one unit to the second rod for independent angular movement thereabout, the corresponding toggle link determining the limit of relative angular movement between the braces; means detachably and pivotally connecting the corresponding ends of the braces of the other unit to the fourth rod for independent angular movement thereabout, the corresponding toggle link determining the limit of relative angular movement between the braces; means detachably and pivotally connecting the other corresponding ends of said braces of said first unit to the first and third rods; and means detachably and pivotally connecting the other corresponding ends of said braces of said other unit to the third and fifth rods whereby a shelter configuration is determined by fixing the outside sections of said shelter.

8. The combination as set forth in claim 6 in which said pivotally connecting means comprises swivels angularly movable about intermediate portions of said rods, said swivels having short projecting parts adapted to be moved into telescopic relationship with said braces.

9. The combination as set forth in claim 7 in which said detachably and pivotally connecting means comprise swivels mounted on and angularly movable about the rods, said swivels having radial projections, said braces being tubular for reception at their ends of said radial projections, said material being sufficiently stretchable to allow assembly of said braces with said swivels and releasably to maintain the assembly thereof.

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KENNETH DOWNEY, Primary Examiner

U.S. Cl. X.R.

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