United States Patent [19]

Warner et al.

[11] **3,848,615**

[45] **Nov. 19, 1974**

[54] **COLLAPSIBLE AND FOLDABLE SHELTER**

[76] Inventors: **Gerhardt Allan Warner; Kurt E. Warner,** both of 52 Talbot Ave., Winnipeg, Manitoba, Canada

[22] Filed: **Feb. 1, 1973**

[21] Appl. No.: **328,749**

[52] **U.S. Cl.** ..... **135/4 R,** 135/7.1 R, 135/5 R

[51] **Int. Cl.** **A45f 1/16**

[58] **Field of Search** ..... 135/1 R, 3 R, 4 A, 4 R, 135/7.1 R, 5 B

[56] **References Cited**

UNITED STATES PATENTS

1,990,804	2/1935	Watson	135/5 B
2,615,458	10/1932	Jones	135/4 A
2,792,844	5/1957	Clark	135/1 R
2,992,649	7/1961	Swallow	135/4 A
3,036,583	5/1962	Miller	135/4 A
3,513,861	5/1970	Johnson	135/4 R
3,675,667	7/1972	Miller	135/4 R

FOREIGN PATENTS OR APPLICATIONS

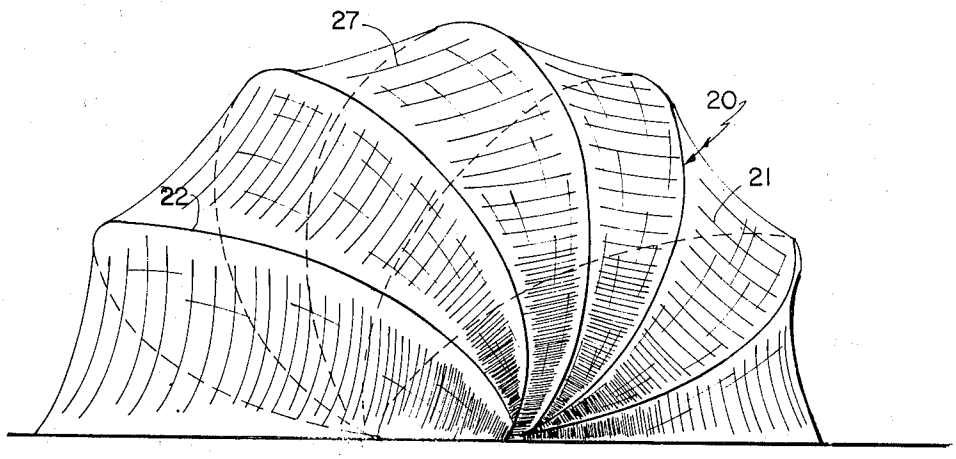
861,064	2/1961	Great Britain	135/4 R

Primary Examiner—Jordan Franklin
Assistant Examiner—Conrad L. Berman
Attorney, Agent, or Firm—Stanley G. Ade

[57] **ABSTRACT**

A coil of spring wire or similar material is provided with a flexible cover attached to the coils and the individual coils are secured together at the bases thereof. When erected, a segmented enclosure is formed with the open ends on the ground. The ends are held in contact with the ground by the weight of the coil and due to the holding together of the individual coils at the bases thereof. Access can be by lifting either end assisted by the slight torsion and for storage the coils are moved to an overlapping flat position whereupon one side of the folded coils may be moved towards the other and the coils twisted to form a figure 8. The ends of the figure 8 are then overlapped one with the other to make a circle of approximately half the diameter of the individual coil diameter at which time ties are provided to hold the coils in the folded position for storage and transportation purposes. Alternatively, the device may be in any orientation in space and may be any part or all of a segment of a torus.

4 Claims, 18 Drawing Figures



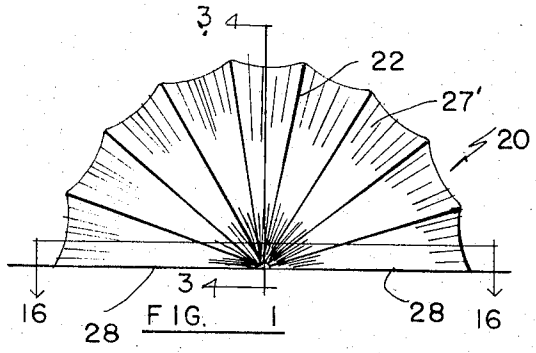


FIG. 1

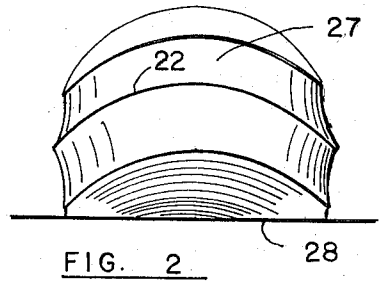


FIG. 2

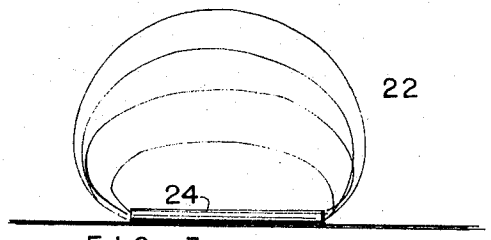


FIG. 3

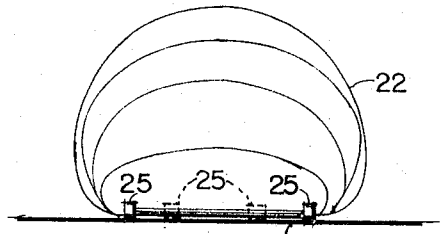


FIG. 4

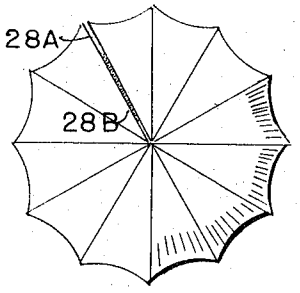


FIG. 18

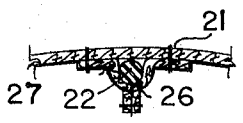


FIG. 5

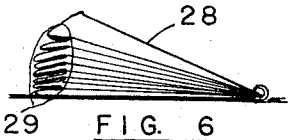


FIG. 6

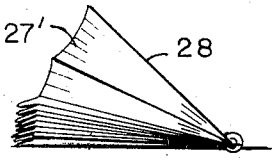


FIG. 7

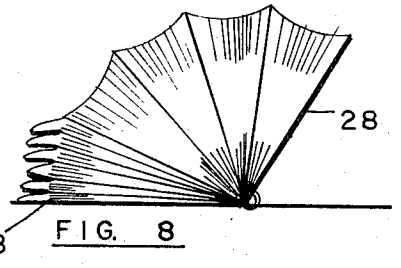


FIG. 8

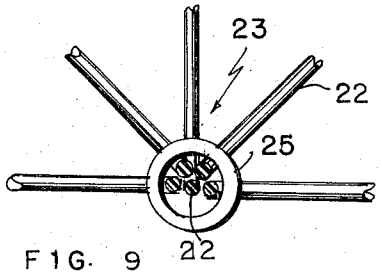


FIG. 9

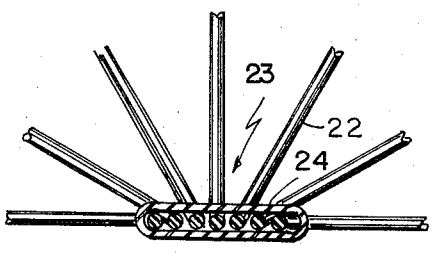


FIG. 10

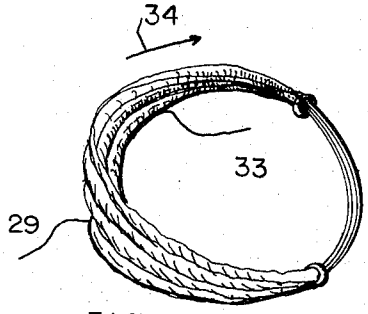


FIG. 11

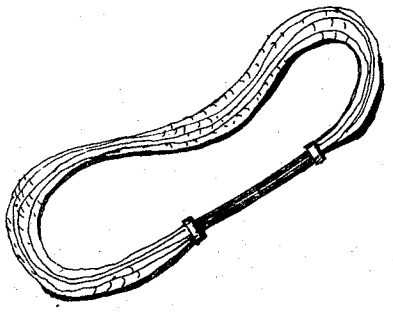


FIG. 12

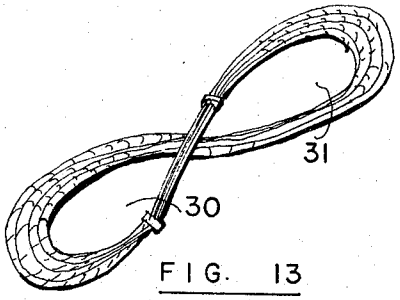


FIG. 13

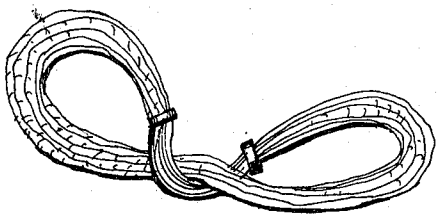


FIG. 14

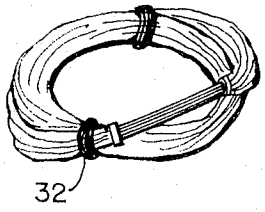


FIG. 15

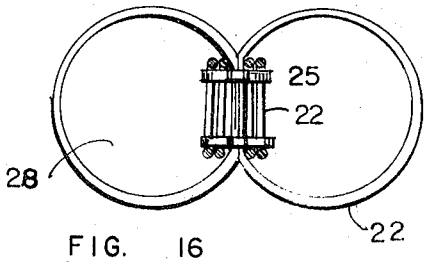


FIG. 16

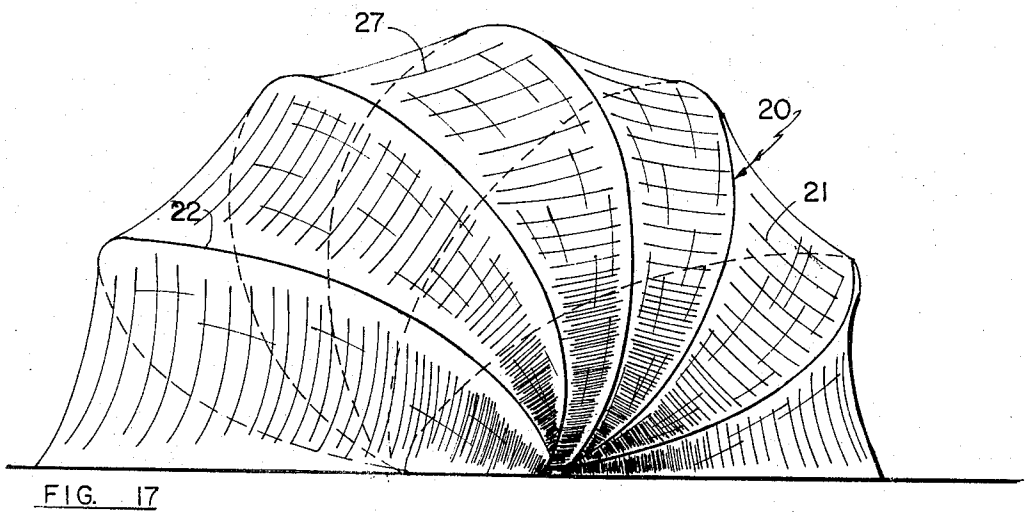


FIG. 17

COLLAPSIBLE AND FOLDABLE SHELTER

BACKGROUND OF THE INVENTION

This invention relates to new and useful improvements in collapsible and foldable shelters or containers such as granaries.

It is well known to have individual hoops made out of steel, plastic or some fairly rigid material and which are then covered with a skin or cover of flexible material. The hoops are stored flat and when in use are fanned out to form the shelter. Each hoop is normally separate and locks into a hinge or socket so that the hoops form the frame and the material covering the frame forms the protective covering. Shelters of this type are however, unsatisfactory for many applications because the frame lacks rigidity and is costly to manufacture. Furthermore, it is inconvenient to enter or leave such a shelter as a relatively large portion of the weight of the hoops and cover have to be elevated so that the person can enter or exit. Furthermore, such devices do not fold up easily into a relatively small space for storage and transportation.

SUMMARY OF THE INVENTION

The present invention overcomes disadvantages inherent with this type of shelter by utilizing a continuous helical coil spring for a frame and covering same with a flexible material. By holding the bases of the individual coils together, slight torsion is provided to the structure when open so that the ends can readily be elevated for access and exit purposes and are held firmly in position by the weight of the frame structure. The stresses are induced in the frame of a continuous helical coil spring, with one part of the coil circles confined or held together. When the individual coils are fanned out to form a torus or segment thereof, the induced stresses tend to make the frame rigid.

The principal object and essence of the invention is therefore to provide a foldable and collapsible shelter or container which is readily erected to cover a variety of objects or to provide protection for work in progress under any circumstances.

Another object of the invention is to provide a device of the character herewithin described which can readily be folded up into a relatively small size for storage and transportation purposes.

Another object of the invention is to provide a device of the character herewithin described which can be made in a plurality of sizes depending upon design parameters.

A still further object of the invention is to provide a device of the character herewithin described which is simple in construction, economical in manufacture, and otherwise well suited to the purpose for which it is designed.

With the foregoing objects in view and other such objects and advantages as will become apparent to those skilled in the art to which this invention relates as this specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic side elevation of the shelter in the erected position.

FIG. **2** is an end view of FIG. **1.**

FIG. **3** is a section along the line **3—3** of FIG. **1.**

FIG. **4** is a section similar to FIG. **3** but showing the preferred embodiment.

FIG. **5** is an enlarged fragmentary section showing one method of securing the cover to the frame.

FIG. **6** is a schematic view of the shelter in the collapsed position.

FIG. **7** is a schematic view showing the shelter partly erected.

FIG. **8** is a schematic view showing the shelter almost fully erected.

FIG. **9** is a fragmentary side elevation showing one method of securing the bases of the coils together.

FIG. **10** is a view similar to FIG. **9** but showing an alternative method.

FIGS. **11** to **15** are schematic views showing how the shelter is folded for storage and transportation purposes.

FIG. **16** is a plan sectional view substantially along the line **16—16** of FIG. **1.**

FIG. **17** is an isometric view of the shelter erected.

FIG. **18** is a plan view of a full torus configuration reduced in scale with respect to the other views.

In the drawings like characters of reference indicate corresponding parts in the different figures.

DETAILED DESCRIPTION

Proceeding therefore to describe the invention in detail, the shelter consists of a frame collectively designated **20** and a cover **21.** While the drawings show the device with the open ends engaging the ground, nevertheless this should not be construed as limiting as the device can be in any orientation in space as exemplified by FIG. **18.**

The frame is formed from a continuous length or strand of resilient or spring like material such as wire, plastic or the like formed in a helical coil spring formation, it being understood that the degree of resiliency is controlled by the design of the frame.

The frame thus formed is made up of a plurality of individual coils **22** and these coils are held at the bases or by common parts thereof by means of **23** and shown in detail in FIGS. **3** and **4.**

In FIG. **3** this means takes the form of a length of pipe or tube **24** and each base or common part of each individual coil is threaded through this pipe so that they are held together in a relatively planar configuration between the ends of the pipe **24.**

The preferred embodiment is shown in FIGS. **4** and **10** under which circumstances the bases or common parts of the individual coils **22** are held by tie means **24** which may take the form of hog rings or flexible ties as desired. These ties are spaced apart one from the other as clearly shown in FIG. **4.**

In order to provide for smooth rotation for all of the individual coils to pass through the tube **24** in correct sequence shown in FIG. **3,** this tube may be flattened as shown in FIG. **10.** Also the hog rings may be numerous and flattened to allow individual coils to follow each other in planned sequence for smooth rotation.

The frame **20** is covered by a flexible cover **21** which may take the form of a mesh, plastic sheet, film or canvas or the like depending upon the application. In any event means are provided to secure the frame to the cover which, in this embodiment, take the form of a plurality of pockets or loops **26** secured to the inner

surface **27** of the cover material **21,** through which the individual coils **22** of the frame are threaded during manufacture so that a tube of cover material covers the entire frame so that the cover is formed in a plurality of gores or panels **27'** between adjacent individual coils **22.** However, any convenient method may be used and the drawings show one example. If the skin or cover consists of a plurality of gores sewn together then the attaching means should follow the seam lines for strength. Alternatively the cover may be secured to the inside of the frame if desired.

With the bases of the individual coils being held together as hereinbefore described, stress or torsion is inducted within the coil forming the frame **20** so that it may be opened out to the position shown in FIGS. **1** and **17** under which circumstances the substantially circular ends **28** of the structure engage the ground or supporting surface as shown in the drawings, as shown in FIG. **18,** or in the case of a complete torus, neither end engages the ground but the ends engage each other as at **28A.**

Access may be obtained by lifting one end or the other assisted by the torsion of the spring coil frame and this, of course, engages the ground once again when released due to the weight thereof or by a door in the skin (not illustrated).

Considerable area is provided depending of course upon the diameter of the individual coils **22** and the area covered may take the form shown in the plan view in FIG. **16.**

With either method of holding the bases or common parts together, the structure may be folded to the position shown in FIG. **6** by lifting one end and moving it from the position shown in FIG. **8** through the position shown in FIG. **7** to the position shown in FIG. **6.** If the tube construction is used shown in FIGS. **3** and **9,** then a tie may engage around the upper ends or sides of the frame, said tie being illustrated by reference character **29** in FIG. **6.**

However, if the desired embodiment is used as illustrated in FIGS. **4** and **10,** the structure may be folded further to make a smaller package for transportation and storage purposes.

Under these circumstances, the shelter is laid flat as shown in FIG. **11** (corresponding to the position shown in FIG. **6**) and a tie **29** may be placed around the upper end as hereinbefore described.

The structure is then raised upon one side and the upper side is urged downwardly towards the lower side in the position shown in FIG. **12.** Due to the inherent characteristics of a circle of spring like material, this frame may then be turned into a figure **8** configuration illustrated in FIG. **13.**

Once in this position, the individual loops **30** and **31** of the figure **8** may be overlapped one with the other as shown in FIG. **14** thus terminating in the configuration shown in FIG. **15** whereupon a further tie **32** may be provided adjacent the areas where these sections of the coils overlap one another.

In order to erect the shelter, tie **32** is released and, with care being taken, the structure is moved through the position shown in FIG. **14** to the position shown in FIG. **13** whereupon the first tie **29** is removed and the structure allowed to assume the position shown in FIG. **12.** Once opened fully, it may be laid flat as shown in FIG. **11** and one end may be pulled up by means of a cord **33** being pulled in the direction of arrow **34** so that the strucure assumes the position shown in FIGS. **1** and **17.**

The device is useable under a plurality of circumstances such as shelters for recreation purposes, and as a shelter in construction, home, farm or other uses or as a container for grain or the like.

It can be made in a plurality of sizes and the number of individual gores of course depends upon design parameters.

Although the drawings show a segment of the torus extending through approximately 180° when extended, nevertheless it will be appreciated that the segment can be of any number of degrees depending upon circumstances. Furthermore it can be laid on its side against a vertical surface or, alternatively, can consist of a full torus under which circumstances the ends **28** engage one another and may be secured by any convenient fastening means such as slide fastener means **28B** shown schematically in FIG. **18.** A door (not illustrated) may be provided in the wall for access to the enclosure which is particularly suitable for the storage of grain or the like when manufactured in this embodiment.

Since various modifications can be made in my invention as hereinabove described, and many apparently widely different embodiments of same made within the spirit and scope of the claims without departing from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

What we claim as our invention is:

1. A collapsible and foldable enclosure comprising in combination a continuous helical coil spring forming a frame and a flexible cover secured to the individual coils of said coil spring, and means to hold parts of said individual coils together on common parts of the perimeter thereof and in consecutive order, said means includes at least one tie member engaging around said common parts of said individual coils, all of said coils passing through said tie member in consecutive order, whereby said frame can be moved from between the open position with the ends engaging a surface thus forming a partial torus, and the closed position with the individual coils in an overlapping relationship of substantially circular configuration, and means to secure said cover to said individual coils thereby defining gores between said individual coils, said continuous helical coil spring transferring the gravitational and aerodynamic load from one individual coil to the other individual coils.

2. The shelter according to claim **1** in which said means to secure said cover to each individual coil includes at least one pocket formed on the surface of said cover, a portion of said coil passing through said pocket.

3. The shelter according to claim **1** in which said means to hold the common parts together includes a tube having a substantially elliptical cross section, all of said common parts of said individual coils passing through said tube in consecutive order.

4. The shelter according to claim **1** in which the ends of said frame are engaged one with the other when in the open position thus forming a complete torus, and means to detachably secure said ends together.

* * * * *