

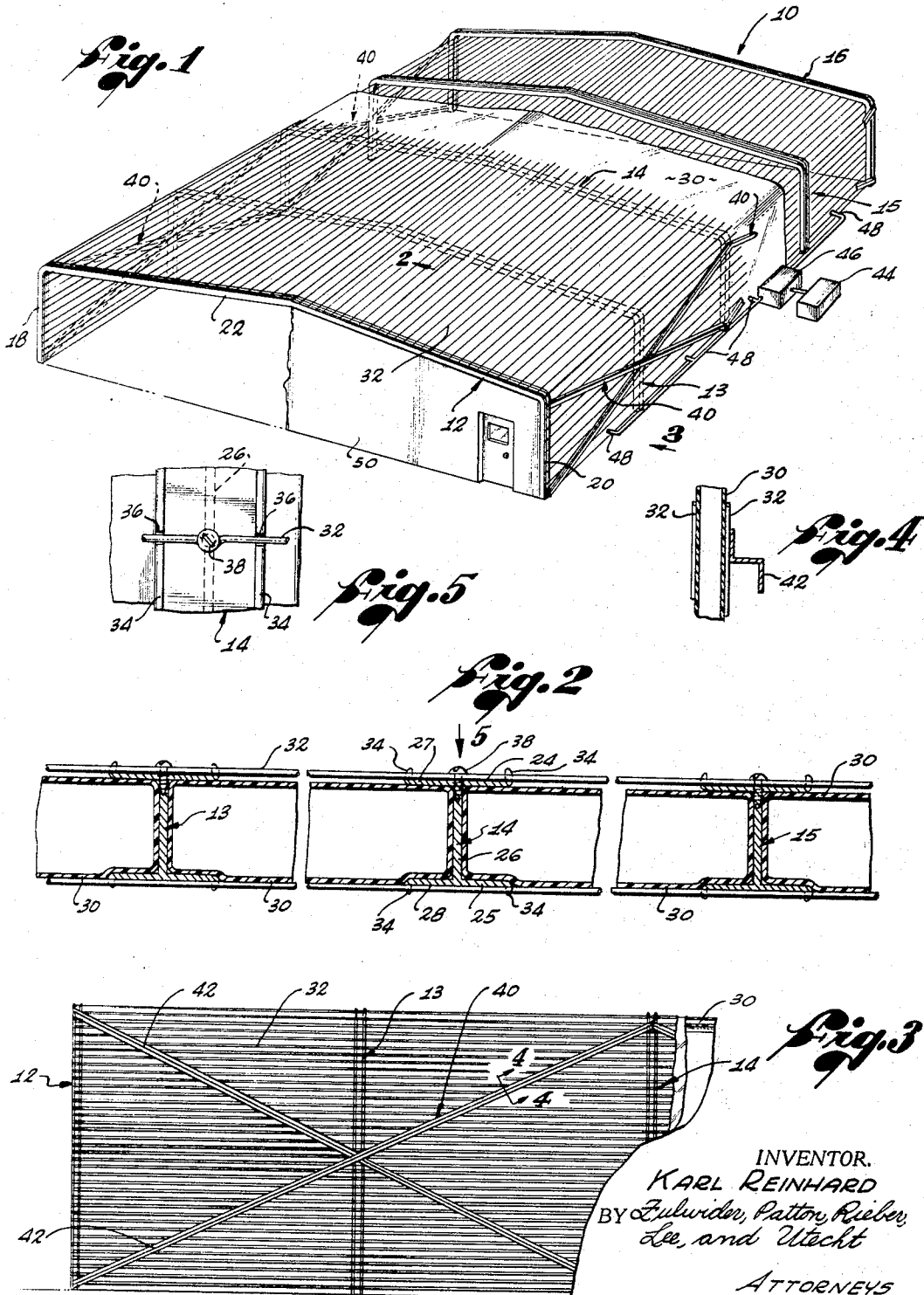
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INFLATABLE HOUSING CONSTRUCTION

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**INFLATABLE HOUSING CONSTRUCTION**  
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This invention relates generally to improvements in the construction of housings of various types, and more particularly to a new and improved inflatable enclosure construction suitable for a wide variety of building applications such as temporary or permanent greenhouses, barracks, canopies, shelters of all sorts and the like.

A great deal of time, money and effort has been expended in the building industry in order to develop simpler and more economical structural designs. One approach, which has been found particularly suitable for temporary building structures, has been to use inflatable enclosures in order to avoid the high cost of other building materials, as well as to reduce the time and labor required to set up the enclosure. However, while such inflatable enclosures have generally served their purpose, they have not proven entirely satisfactory under all conditions of service from the standpoints of ruggedness, reliability and temperature control for the interior of the enclosure.

Accordingly, it is an object of the present invention to provide a new and improved inflatable housing construction which overcomes the above and other disadvantages of the prior art.

Another object is to provide a new and improved housing construction which is relatively simple and economical, yet strong and durable.

A further object of this invention is the provision of a new and improved housing construction using a minimum number of building components to provide a strong, durable enclosure.

Still another object is to provide a new and improved inflatable housing construction capable of admitting substantial amounts of sunlight to the interior of the enclosure while minimizing exposure to the elements.

Yet another object of the present invention is the provision of a new and improved inflatable housing construction capable of providing uniform and accurate temperature control over the interior of the enclosure.

The above and other objects and advantages of this invention will become apparent from the following detailed description, when considered in connection with the accompanying drawing of an illustrative embodiment thereof, and wherein:

FIGURE 1 is a fragmentary, perspective view of an inflatable housing construction in accordance with a presently preferred embodiment of the invention;

FIGURE 2 is an enlarged, fragmentary sectional view through the housing construction, taken along the line 2-2 in FIGURE 1, and illustrates the manner in which inflatable housing sections are supported between pairs of girders;

FIGURE 3 is an enlarged, right side elevational view, taken in the direction of the arrow 3 in FIGURE 1, and illustrates the manner in which the inflatable section supporting girders are braced;

FIGURE 4 is an enlarged, fragmentary sectional view, taken along the line 4-4 in FIGURE 3; and

FIGURE 5 is a fragmentary plan view, taken in the direction of the arrow 5 in FIGURE 2, and illustrating the manner in which wires cooperate with each girder to support the inflated housing sections.

Referring now to the drawings, and particularly to FIGURE 1 thereof, there is shown an inflatable enclosure or housing 10 constructed in accordance with the present invention. The basic framework of the housing 10 comprises a plurality of spaced apart, parallel girders 12, 13,

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14, 15 and 16. Each of the girders 12-16 is preferably fabricated as an extrusion of an appropriate light metal material, such as aluminum or the like, to reduce cost and provide adequate strength with minimum weight.

Each of the girders 12-16 is bent along its length to provide a substantially U-shaped frame member, the same shape being common to all of the girders. The vertical sides of each U-shaped girder, e.g., the sides 18, 20 of the girder 12, define the vertical sides of the framework, whereas the upper, substantially horizontal portion 22 of the girder 12, is provided with a shape in accordance with the desired shape of the roof for the housing 10.

As best observed in FIGURE 2, each of the girders 12-16 is provided with a substantially I-beam cross section or any other appropriate beam cross section defining a pair of oppositely directed pockets on each side of the girder and extending along the full length of each girder. By way of example, a pocket on the right side of the girder 14 in FIGURE 2 is defined by a pair of upper and lower horizontal flanges 24, 25, respectively, and the central cross member 26. The pocket on the left side of the girder 14 is defined by a pair of upper and lower horizontal flanges 27, 28, respectively, and the cross member 26. In this manner, each of the framework girders 12-16 has a longitudinal pocket horizontally directed towards each of the next adjacent girders. It will be apparent, of course, that the outermost girders 12 and 16 can each have a beam cross section defining only a single longitudinal pocket.

Referring now to FIGURES 1-3, a double walled, closed plastic bag 30 is supported between each pair of adjacent framework girders, i.e., between girders 12 and 13, between girders 13 and 14, between girders 14 and 15 and between girders 15 and 16. Each of the plastic bags 30, in its inflated state, seats at each end in one of the horizontally directed pockets of one of the framework girders, so that each bag spans the entire distance between adjacent girders supporting the bag. In this manner, each plastic bag 30 provides all of the roof and sides of the housing 10 between each pair of adjacent girders.

The plastic bags 30 may be either transparent, translucent or opaque, depending upon whether or not it is desirable to allow sunlight to pass through the bags 30 to the interior of the enclosure. A typical application where the admission of sunlight is desirable, would be if the housing 10 were used as a greenhouse or the like for growing plants, or where the housing is utilized as a solarium or the like. Moreover, some of the bags 30 may be made opaque, while others are made transparent or translucent, where it is desired to admit direct sunlight only to selected areas of the housing 10.

Each of the bags 30 is held in place, and its weight between the girders is thereby further supported, by a wire array 32 passing back and forth both above and below all of the bags and framework girders 12-16. The wire array 32 may be formed by a single continuous wire, of aluminum, steel or the like, which is run back and forth between the outermost girders 12, 16 or by a plurality of individual wires which are run back and forth between the girders to provide a similar array above and below the plastic bags 30.

As best observed in FIGURES 2 and 5, the upper and lower pocket-defining horizontal flanges of each of the girders, e.g. 14, are each provided with an outwardly turned lip 34 at the remote end of each flange. Each of these lips is provided with a plurality of guide notches 36 along its length to hold the wire array 32 in place above and below each framework girder. Preferably, the wire array 32 is secured to each framework girder each time a wire passes over or under one of the girders. One manner of accomplishing this is to pass the wire 32 around a

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screw 38 which is in threaded engagement with the horizontal flanges and cross member 26 at the top or bottom side of each girder. The latter provides a simple and reliable expedient for securing the wire matrix 32 to the top and bottom sides of each of the framework girders.

Referring now more particularly to FIGURES 1, 3 and 4, a plurality of trusses 40 are used at each side of the housing 10 to reinforce the framework. Each truss 40 comprises a pair of Z-rails 42 or any other rigid members which cross at their centers and have their upper and lower ends secured in any appropriate manner to the upper and lower ends of spaced apart framework girders, such as the girders 12 and 14 in FIGURES 1 and 3. Typically, the ends of the truss members 42 are flattened and spot welded to the sides of the framework girders. It will be apparent that, while each truss 40 in FIGURES 1 and 3 is illustrated as spanning the distance between three framework girders, truss configurations may be utilized which span a greater or lesser number of girders without in any way departing from the spirit and scope of the invention.

Referring now again to FIGURE 1, a pump 44 and heating or cooling unit 46 deliver air under pressure through a plurality of air inlet conduits 48 to each of the plastic bags 30, to inflate the bags and control the temperature of the air within each bag. Hence, since the air within each inflated bag 30 is at a precisely controlled temperature, and this temperature is uniform throughout the roof and side sections of the housing 10 defined by each particular bag, the temperature within the housing can be well controlled. In this connection, it will be apparent that separate pump and temperature control units, or a single pump with a plurality of individual temperature control units may be utilized in lieu of the single pump and temperature control units 44, 46, respectively, illustrated in FIGURE 1.

It will be apparent that, for the simplest of shelter or canopy applications, the housing 10 may be utilized with open ends. However, where greater protection from the elements, more precise interior temperature control, or simply a more permanent structure is desired, any appropriate end wall construction, such as the end wall construction 50 adjacent the framework girder 12 may be employed. Typically, in the interest of low cost, each end wall is of prefabricated construction adapted for convenient attachment to each of the outermost framework girders 12, 16. However, it is within the scope of this invention to provide end walls of any well known construction, such as wood, metal, brick and the like.

The present invention satisfies a long existing need in the building industry for an inflatable enclosure which is relatively simple, economical and easy to construct, yet is strong, durable and capable of providing precise control over interior temperatures.

It will be apparent from the foregoing that, while a particular form of my invention has been illustrated and described, various modification can be made without departing from the spirit and scope of my invention. Accordingly, I do not intend that my invention be limited, except as by the appended claims.

I claim:

1. A housing construction, comprising:
  - a plurality of spaced apart, parallel, U-shaped girders, each girder having a cross section defining a longitudinal pocket directed towards each next adjacent girder;
  - a pair of parallel, longitudinal lips along the upper and lower surfaces of each girder on opposite sides of each girder, and a plurality of guide notches in each lip along the length of each lip;
  - an inflated plastic bag supported between each pair of adjacent girders and seated in the pockets defined between each pair of adjacent girders;
  - and wire means passing over and under all of said girders and each inflated bag for additionally sup-

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porting each bag, said wire means passing through said guiding notches in the lips of each girder.

2. A housing construction as set forth in claim 1, wherein said girders are aluminum extrusions.
3. A housing construction, comprising:
  - a plurality of spaced apart, parallel girders, each girder having a substantially I-beam cross section, the upper and lower surface of each girder having at least one longitudinal lip having guide notches defined therein at spaced apart positions along each lip;
  - an inflated, double-walled bag mounted between each pair of adjacent girders and seated in the pair of pockets defined by confronting I-beam sections of each pair of girders;
  - and wire means passing through said guide notches and extending between each pair of girders above and below each bag and all of said girders.
4. A housing construction, comprising:
  - a plurality of spaced apart, parallel extrusions, each extrusion having a substantially I-beam cross section, the upper and lower surface of each extrusion having at least one longitudinal lip having guide notches defined therein at spaced apart positions along each lip;
  - an inflated, plastic bag mounted between each pair of adjacent extrusions and seated in the pair of pockets defined by confronting I-beam sections of each pair of extrusions;
  - wire means passing through said guide notches and extending between each pair of extrusions above and below each bag and all of said extrusions;
  - and truss means attached to said extrusions for bracing said extrusions.
5. A housing construction, comprising:
  - a plurality of spaced apart, parallel extrusions, each extrusion having a substantially I-beam cross section, the upper and lower surface of each extrusion having at least one longitudinal lip having guide notches defined therein at spaced apart positions along each lip;
  - an inflated, plastic bag mounted between each pair of adjacent extrusions and seated in the pair of pockets defined by confronting I-beam sections of each pair of extrusions;
  - wire means passing through said guide notches and extending between each pair of extrusions above and below each bag and all of said extrusions;
  - means for maintaining the pressure within each inflated bag;
  - and means for controlling the temperature of the gas within each inflated bag.
6. A housing construction, comprising:
  - a plurality of spaced apart, parallel extrusions, each extrusion having a substantially I-beam cross section, the upper and lower surface of each extrusion having a pair of parallel longitudinal lips having guide notches defined therein at spaced apart positions along said lips;
  - an inflated, plastic bag mounted between each pair of adjacent extrusions and seated in the pair of pockets defined by confronting I-beam sections of each pair of extrusions;
  - wire means passing through said guide notches and extending between each pair of extrusions above and below each bag and all of said extrusions;
  - truss means attached to said extrusions for bracing said extrusions;
  - means for maintaining prescribed gas pressure within each inflated bag;
  - and means for controlling the temperature of the gas in each inflated bag.
7. A housing construction, comprising:
  - a plurality of spaced apart, parallel extrusions, each extrusion having a substantially I-beam cross section, the upper and lower surface of each extrusion having

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a pair of parallel longitudinal lips having guide notches defined therein at spaced apart positions along said lips;

an inflated, plastic bag mounted between each pair of adjacent extrusions and seated in the pair of pockets defined by confronting I-beam sections of each pair of extrusions; 5

wire means passing through said guide notches and extending between each pair of extrusions above and below each bag and all of said extrusions; 10

a plurality of intersecting rails connected between selected pairs of said extrusions and defining truss means for bracing said extrusions;

means for maintaining prescribed gas pressure within each inflated bag; 15

and means for controlling the temperature of the gas in each inflated bag.

8. A housing construction, comprising:

a plurality of spaced apart, parallel extrusions, each extrusion having a substantially I-beam cross section, the upper and lower surface of each extrusion having a pair of parallel longitudinal lips having guide notches defined therein at spaced apart positions along said lips; 20

an inflated, plastic bag mounted between each pair of adjacent extrusions and seated in the pair of pockets 25

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defined by confronting I-beam sections of each pair of extrusions;

wire means passing through said guide notches and extending between each pair of extrusions above and below each bag and all of said extrusions;

a plurality of intersecting rails connected between selected pairs of said extrusions and defining truss means for bracing said extrusions;

a pair of walls, one at each end of said housing construction and in engagement with the outermost extrusion at each end of said housing for closing off the ends of said housing;

means for maintaining prescribed gas pressure within each inflated bag;

and means for controlling the temperature of the gas in each inflated bag.

9. A housing construction as set forth in claim 8, wherein said extrusions and said rails are of aluminum, and at least one inflated bag is transparent.

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