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AIRBORNE CORNER REFLECTOR

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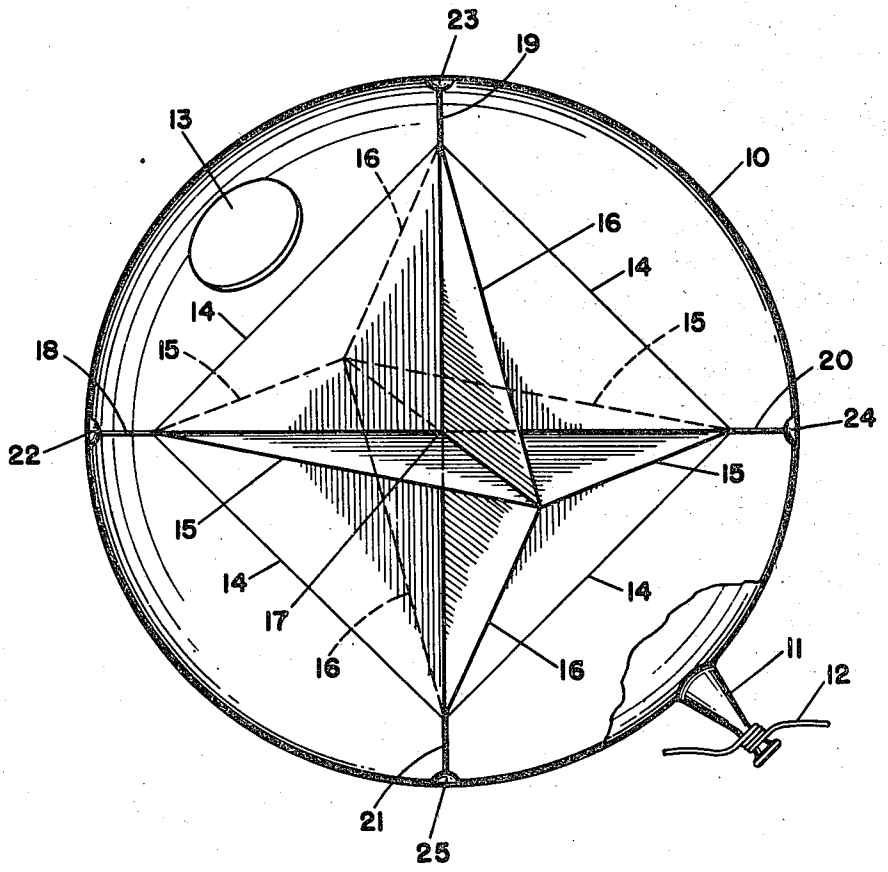

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AIR-BORNE CORNER REFLECTOR

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6 Claims. (Cl. 343—18)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to a balloon with an enclosed radar reflector.

More particularly, the illustrated embodiment of the invention is a combined collapsible balloon and radar corner reflector assembly which is compact and which may be inflated by gas to operative condition. As will be understood, hydrogen or helium are suitable gases for inflating the baloon assembly. The reflector unit is completely enclosed within the balloon and is secured at spaced points about its inner periphery. The reflector may conveniently be made with three pieces of electrically conductive material intersecting or cut so that their planes make right angles with each other and all pass through a common geometrical center to form eight sections. The conductive material may be elastic knitted, woven, or other material naturally, or treated to render it, conductive, or thin metallic sheet material and the like.

Prior to these improvements, it was the practice to suspend a radar corner reflector from a balloon prior to ascent. This prior construction creates a drag which importantly restricts the rate of ascent and the altitude attained by units of convenient size. In addition to the wind or air resistance, of prior constructions, the additional weight of a frame work for the reflector adds to the total drag.

The present improvements eliminate the drag caused by the use of a separate suspended reflector unit and enables the use of a very light-weight reflector. The reflector can be more fragile than previously, as it is protected against weather by the rubber balloon structure. It is held in operative position within the balloon by the gas pressure against the inside of the balloon.

While the invention is of paramount importance in ascending balloon assemblies, it may be used in fixed installations such as can be used for navigation. In the former case, the weight of a rain-soaked or ladened reflector adds to the drag of separate units and in the latter case the protection to the reflector afforded by the balloon multiplies its life several times. Upper wind velocities, i. e., at elevations of from 30,000 to 40,000 yards, heretofore unobtainable, may be recorded by use of the present invention. With prior devices such readings could not be obtained because these heights were not attained by the balloon and unit or at least not while it remained in recording range. As will be understood, the balloon is made of electrically non-conducting material.

The device being collapsible can be packed into

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a small space. The elasticity of the supports and/or the reflector unit itself provides for the usual expansion of the ascending balloon. The unit does not cut off the balloon into isolated sections and accordingly it may be filled with gas through a single port. I prefer to seal the balloon after the reflector unit is secured in position. The seal may be a separate piece as illustrated, or may include the intake port.

A typical baloon will be about six (6) feet in diameter, although a such smaller or larger one may be used. The points of the reflector surfaces are joined by rubber bands, as by spot vulcanization. The use of rubber bands or elastic reflector surfaces is to allow for the usual expansion of a rubber balloon as it attains great height with the resulting low atmospheric pressure.

An object of this invention is to provide a combined balloon and enclosed radar reflector unit.

Another object is to provide a unitary structure of light weight which protects the reflector unit against the weather and increases the rate of ascent and altiude attained for a given amount of gas or size of the unit.

Another object is to provide an enclosed radar corner reflector with means to compensate for the lower atmospheric pressure at high altitudes.

These and other objects of invention will be manifest from a consideration of the description, claims and drawings, in which the figure is a sectional view of the inflated balloon and enclosed radar reflector in operative position ready to be launched.

Referring to the drawing, a 3 or 6 foot diameter or other size balloon 10 which may be rubber, paper or cloth treated to render it non-porous, has a gas intake extension or port 11 which may be sealed by an convenient means, such as cord 12. The reflector device may be assembled in position by inserting it through an opening which is later closed as by a vulcanized seal 13.

The reflector unit is collapsible and in operative position forms three intersecting surfaces, 14, 15, and 16, at substantially right angles to each other. The planes of each of the surfaces has a common geometrical center at 17 and, as will be understood, form eight (8) three-sided or trihedral sections. If the figure be turned 90° in either direction about its vertical axis the radar corner reflector portion will be the same as shown. The surfaces 14, 15 and 16 may be sewn or otherwise joined together. The six points of the unit are each connected to rubber bands, such as 18, 19, 20 and 21 which in turn are spot vulcanized or otherwise connected to the inside of the bal-

loon as at 22, 23, 24, 25. Additional rubber bands and connections may be used if desired.

The reflector unit may vary from the illustrated embodiment. For example, the sides may be curved instead of straight, the surfaces may be elastic knit goods, with cords substituted for the rubber bands, and other substitutions within the skill of those trained in the art may be made.

It will be seen that I have eliminated the drags of separate reflector units and the weight of their frame structure and have provided a means for attaining great height with a higher rate of ascent than possible with prior devices of like size. I have done this without impairing the efficiency of the reflector unit.

Having described my invention in a preferred embodiment, I wish it to be understood that any radar reflector such as might be used in radio range detection work with a fixed or ascending balloon is contemplated to be within the scope of the present improvements.

This invention may be made or used by or for the Government of the United States for governmental purposes without the payment to me of any royalties thereon or therefor.

What I claim is:

1. In combination, a collapsible inflatable windsounding balloon, an enclosed collapsible electrically conductive network, means including a multiplicity of elastic supports for securing said network in operative position when the balloon is inflated, said supports being provided to yield with the expansion of the balloon as it attains high altitudes or is subjected to high internal pressure, whereby said network is held rigidly in operative position.

2. In combination, a collapsible windsounding balloon, an enclosed collapsible electrically conductive network, said network having eight three-sided sections the sides of which are at substantially right angles to each other and form six points in all, elastic securing means individually connected to the outer ends of said sections and to the inside of the windsounding balloon.

3. In a radiant energy reflection system a self-contained unit comprising a collapsible inflatable windsounding balloon having a gas intake port and containing therein an enclosed collapsible electrically conductive network comprising eight three-sided sections substantially mounted mutually perpendicular to one another forming six points each secured by elastic means to the inside of said balloon, said formed network reflecting impinging ultra short electromagnetic waves toward their source.

4. An airborne reflector for ultra short magnetic waves comprising a protective, flexible, balloon, an electrically conductive, collapsible, multiplanar reflector network yieldably secured within said balloon, the aforementioned network being held in an uncollapsed position when the balloon is inflated, whereby impinging ultra short magnetic waves are reflected towards their source.

5. An airborne reflector for ultra short magnetic waves comprising an unmanned, free floating, flexible, balloon, an electrically conductive, collapsible, multiplanar reflector network yieldably secured within said balloon, the aforementioned network being held in an uncollapsed position when the balloon is inflated whereby impinging ultra short magnetic waves are reflected towards their source.

6. An airborne reflector for ultra short magnetic waves comprising, an inflatable, flexible, free floating balloon having an intake port for gas, an electrically conductive, collapsible, net work yieldably secured within said balloon, said network being three plane surfaces normal to each other so as to form eight three-sided sections, the aforementioned network being held in an uncollapsed position when the balloon is inflated, whereby impinging ultra short magnetic waves are reflected towards their source.

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