Jan. 5, 1971 J. J. GLYNN 3,553,732

PORTABLE PARABOLIC REFLECTOR FOR MICROWAVE ENERGY

Filed May 29, 1968 2 Sheets-Sheet 1

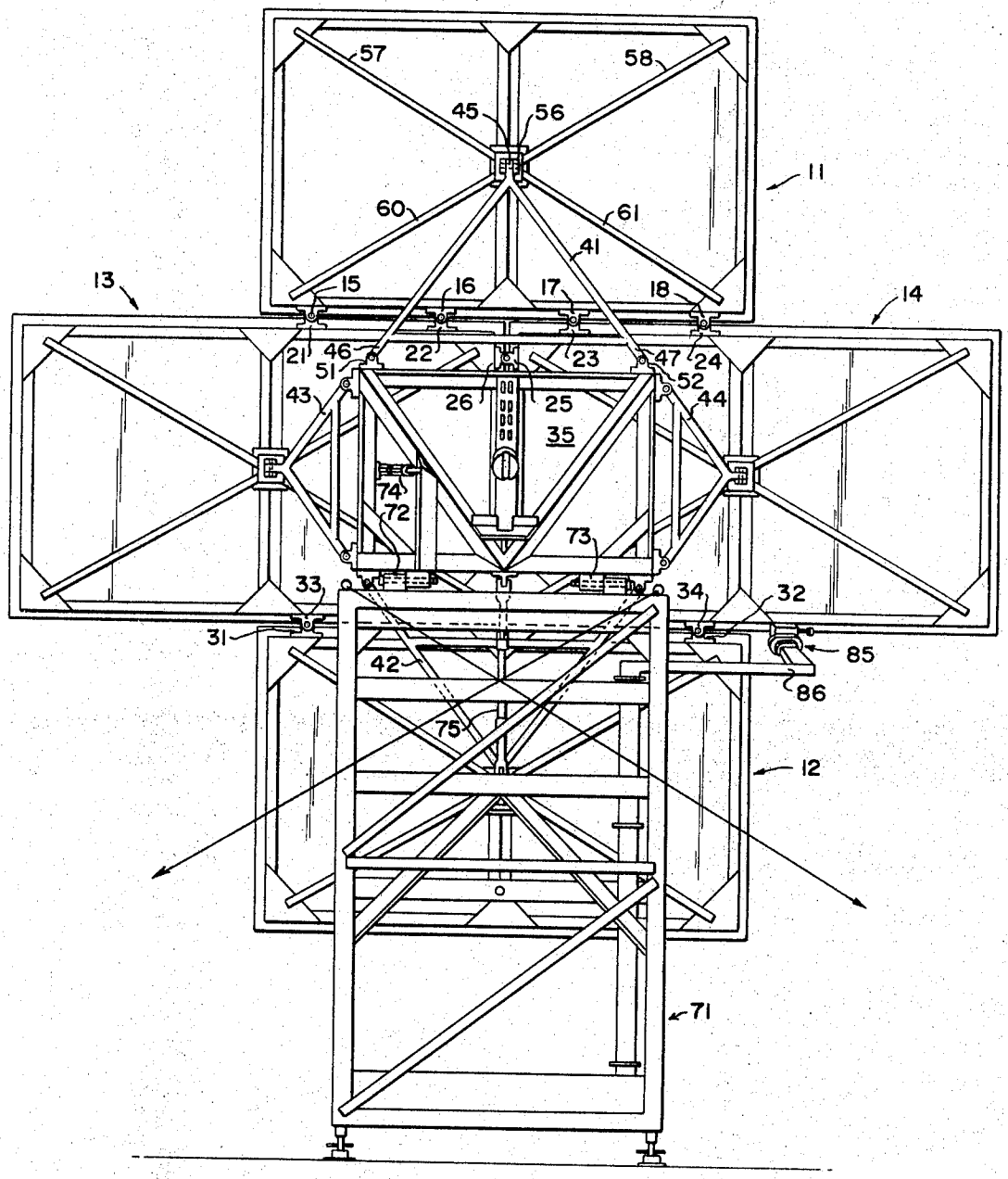


FIG. 1

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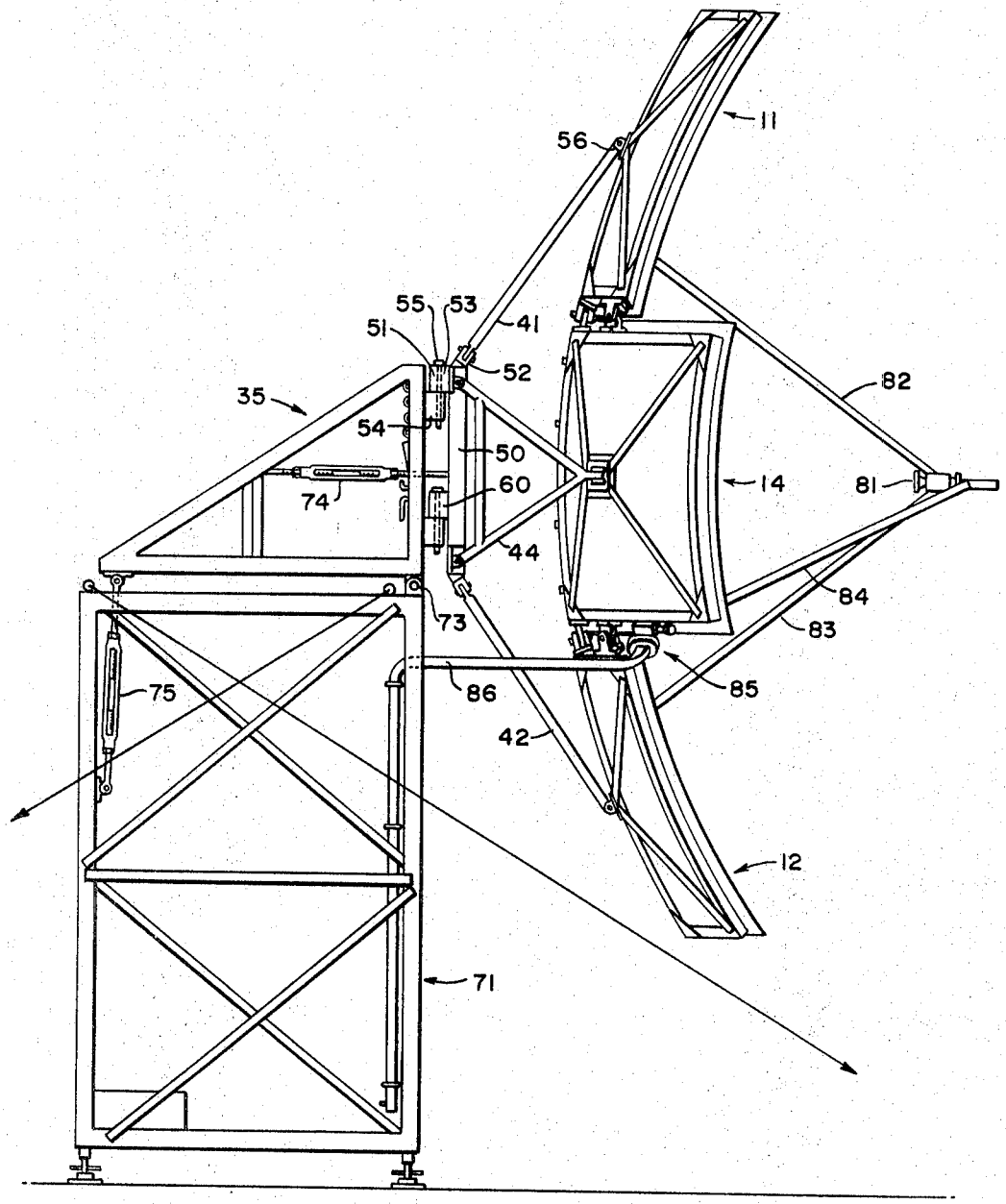
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FIG. 2



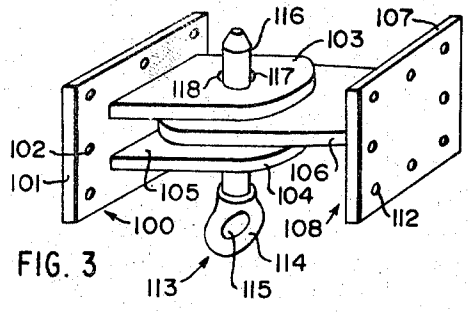


FIG. 3

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PORTABLE PARABOLIC REFLECTOR FOR MICROWAVE ENERGY

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U.S. Cl. 343—840 5 Claims

ABSTRACT OF THE DISCLOSURE

A portable parabolic microwave reflector generally in the form of a cross comprises a series of male and female aluminum castings joined together by means including an alignment pin and spring-loaded balls. Assembled reflector sections are supported by welded, tubular A-frames that become attached to the reflector by means of a series of male and female aluminum castings in conjunction with an alignment pin, locked in place by spring-loaded balls. The A-frames attach to whatever support structure is required to support the antenna.

BACKGROUND OF THE INVENTION

The present invention relates in general to parabolic reflectors and more particularly concerns a sectionalized parabolic reflector of microwave energy where portability is a prime consideration.

In typical mobile and fixed microwave communications stations, it is important to transport the antenna systems to the site of operation using a minimum of storage volume and weight to keep shipping costs low and facilitate transport with a wide variety of transportation media.

Typically the communication industry uses antenna systems having parabolic reflectors manufactured in one piece. These reflectors usually have a circular aperture. Not only are these reflectors expensive to transport, especially in sizes larger than six feet in diameter, but handling is difficult and transport media limited to those capable of handling such large packages. Usually such reflectors are made by spinning a soft aluminum material, such as 1100–0. This forming process has a number of limitations, one of which is the requirement that the reflector surface thickness be at least ⅛", thereby limiting lightweight design capability.

Accordingly, it is an important object of this invention to provide a compactly transportable lightweight sturdy parabolic reflector.

It is another object of the invention to achieve the preceding object with a parabolic reflector having an aperture shape that facilitates minimum storage volume.

It is another object of the invention to achieve one or more of the preceding objects formed of pieces of uniform aperture shape when the reflector is disassembled.

Another important object of the invention is to provide a relatively small reflector aperture to reduce wind loading on the reflector support structure.

It is still a further object of the invention to achieve one or more of the preceding objects while providing a parabolic reflector that exhibits good electrical performance.

SUMMARY OF THE INVENTION

According to the invention, the reflector sections are joined together by means including a series of male and female portions coacting with alignment pin means and locked in place by means including spring-loaded balls. According to another aspect of the invention the reflector sections are supported by welded tubular A-frames attached to the reflector in the same manner as the reflector sections are attached to one another.

Numerous other features, objects and advantages of the invention will become apparent from the following specification when read in connection with the accompanying drawing in which:

BRIEF DESCRIPTION OF THE DRAWING

FIGS. 1 and 2 are back and side views, respectively, of an embodiment of the invention; and

FIG. 3 is a perspective view of interconnecting means according to the invention comprising male and female castings in conjunction with an alignment pin locked in place by spring-loaded balls.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With reference now to the drawing, and more particularly FIGS. 1 and 2 thereof, there are shown back and side views, respectively, of an embodiment of the invention. As seen in FIG. 1, the reflector according to the invention is made up of four similar sections forming a cross. There is an upper section **11**, a lower section **12**, a left section **13** and a right section **14**. Upper section **11** is formed with a number of depending female castings **15**, **16**, **17** and **18** that mate with male castings **21**, **22**, **23** and **24**. Male castings **21** and **22** extend from left section **13** while male castings **23** and **24** extend from the top of right section **14**. Left section **13** and right section **14** are joined together by similar castings, such as female casting **25** on right section **14** and male casting **26** on left section **13**. Similarly lower section **12** is formed with male castings such as **31** and **32** that mate with female castings such as **33** depending from left section **13** and **34** depending from right section **14**.

An upper support member **35** carries the A-frames **41**, **42**, **43** and **44** that keep reflectors **11**, **12**, **13** and **14** in position. Each of these A-frames is formed with three male aluminum castings at each end, such as **45**, **46** and **47** at each end of A-frame **41**. Two of these male castings, such as **46** and **47** mate with a corresponding female casting such as **51** and **52** in a hinged support **50** that is carried by support member **35**. FIG. 2 shows a view of how projection **52** is formed on a support member having an upper hinge portion **53** that rides on a lower hinged portion **54** on frame **35** and aligned therewith by a vertical hinge pin **55** to permit azimuth alignment of the reflector. The other male casting, such as casting **45**, is seated within a female casting, such as **56** at the point of a pyramid defined by four support rods, such as **57**, **58**, **60** and **61** extending from the corners of a reflector section such as upper section **11**.

Upper support member **35** is carried by a pedestal **71** on a left hinge **72** and a right hinge **73**. An azimuth turnbuckle **74** adjusts support frame **50** about the upper hinge portion **53** and lower hinge portion **54** to permit orientation of the reflector assembly in azimuth. Elevation turnbuckle **75** adjusts the pitch of upper support member **35** about left hinge portion **72** and right hinge portion **73** to permit adjustment of the assembly in elevation.

The reflector assembly is illuminated by a horn **81** supported by upper and lower supports **82** and **83** having its center of radiation substantially at the reflector focal point and fed by a waveguide assembly **84** that also functions to provide support for horn **81**. A waveguide coupling assembly **85** couples waveguide **84** to the waveguide sections **86** that may be connected to an associated transmitting and/or receiving system.

Referring to FIG. 3, there is shown a perspective view of the interconnecting means according to the invention comprising male and female castings in conjunction with an alignment pin locked in place by spring loaded balls.

Female casting **100** comprises a base plate **101** formed with fastening holes, such as **102**, and a pair of perpendicularly extending end blades **103** and **104** defining a slot **105** for receiving an intermediate blade **106** extending perpendicularly from base plate **107** of male casting **108**. Base plate **107** is formed with fastening holes, such as **112**. Blades **103**, **104** and **106** are each formed with a hole for snugly accommodating alignment and locking pin **113**.

Pin **113** has a head **114** with an eyelet **115**. The other end **116** of pin **113** is tapered and carries a pair of spring-loaded balls **117** and **118**. Eyelet **115** may receive one end of a string, the other end of which is tied to a point near the casting to help prevent losing pins and insuring their convenient availability during assembly.

Assembly is quick and simple. The intermediate blade **106** is inserted in slot **105** with the holes in blades **103**, **104** and **106** in alignment about a common axis. Then pin **113** is pushed through the three aligned holes until spring loaded balls **117** and **118** pop out after clearing the hole in end blade **103**. Disassembly is equally quick and simple. Pin **113** is removed, and blade **106** removed from slot **105**.

There has been described a novel transportable reflector support structure characterized by transportability, ruggedness, high electrical performance, ease of assembly and disassembly, ease of fabrication, disassembly into compact components compactly storable for ease and economy in transportation and ease of directional adjustment. It is evident that those skilled in the art may now make numerous modifications and uses of and departures from the specific embodiment described herein without departing from the inventive concepts. Consequently, the invention is to be construed as embracing each and every novel feature and novel combination of features present in or possessed by the apparatus and techniques herein disclosed and limited solely by the spirit and scope of the appended claims.

What is claimed is:

1. A reflector comprising,

a plurality of similar sections,

means for detachably securing said similar sections together to form a reflecting means of generally cross-shape characterized by a focal point and comprising means for focusing energy incident upon said reflecting means along a direction generally parallel to the axis thereof upon said focal point,

said means for detachably securing comprising male and female portions coacting with alignment pin means locked in place by means including spring-loaded ball means,

each female portion comprising a base and a pair of end blades extending perpendicularly from said base defining an intermediate blade receiving slot with each end blade formed with an aligned opening for receiving said alignment pin means.

each male portion comprising a base and an intermediate blade for insertion in said intermediate blade receiving slot of an associated female portion,

said intermediate blade being formed with an opening for alignment with said end blade openings to accommodate said locking pin.

2. A reflector in accordance with claim **1** and further comprising electromagnetic energy transducing means, and means for supporting said electromagnetic energy transducing means substantially at said focal point.

3. A reflector in accordance with claim **1** wherein there are four generally rectangular ones of said similar sections with an uppermost one separated from a lowermost one by a left one and an immediately adjacent right one.

4. A reflector in accordance with claim **1** wherein said alignment pin is formed with a head at one end and a pair of diametrically opposed spring-loaded balls at the other end.

5. A reflector in accordance with claim **1**, further including support means permitting the reflector means to be oriented in azimuth about a vertical axis and oriented in elevation about a horizontal axis, the support means comprising

a pedestal,

a first frame pivotally mounted on the pedestal for movement about one of the vertical and horizontal axes,

a second frame pivotally mounted on the first frame for movement about the other of the vertical and horizontal axes,

and means for attaching the assembled reflecting means to the second frame to form therewith a rigid structure.

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U.S. Cl. X.R.

343—882, 915