Feb. 8, 1966 R. E. THOMAS 3,234,550

THIN SKINNED PAROBOLIC REFLECTOR WITH RADIAL RIBS

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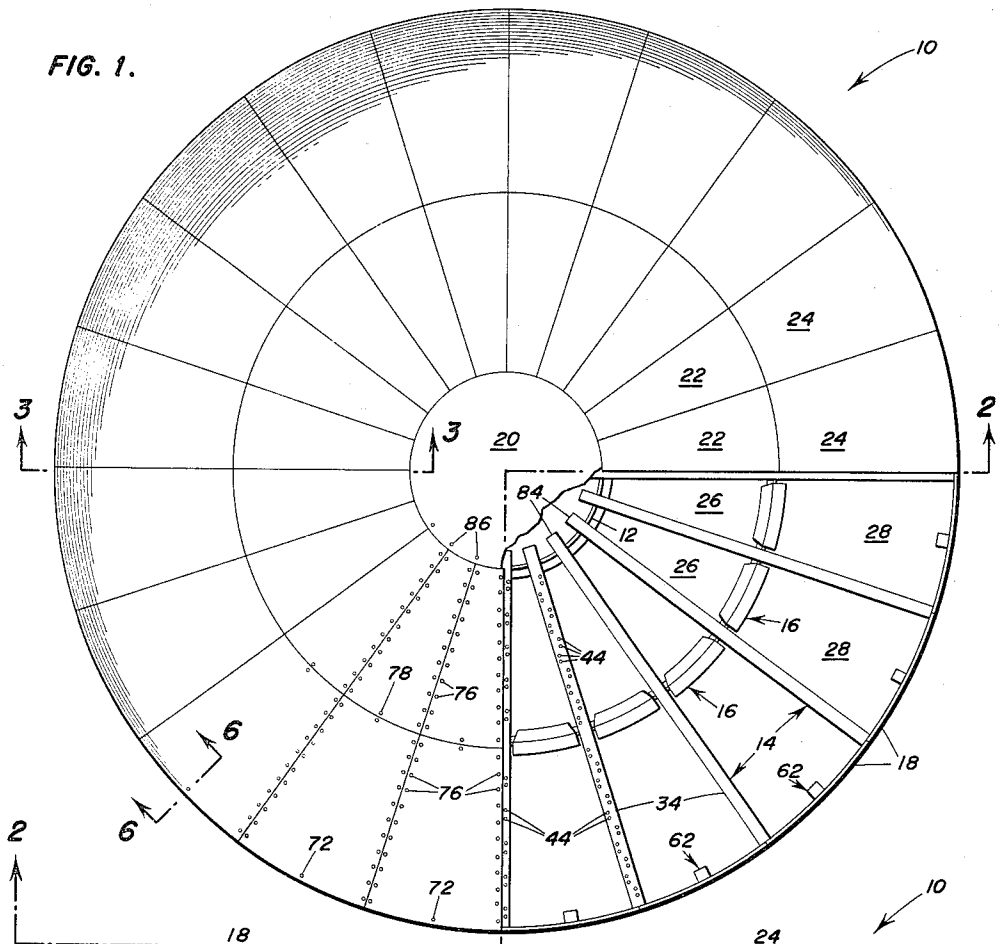
FIG. 1.



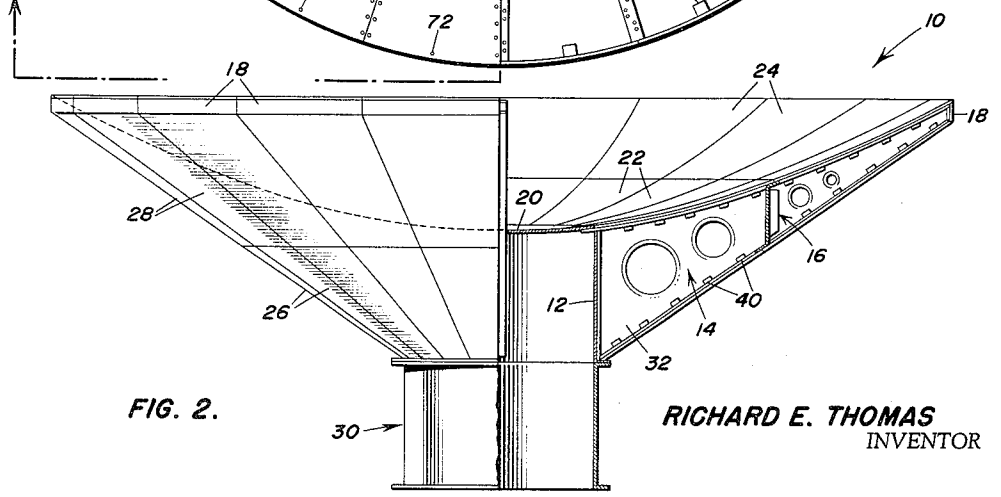


FIG. 2.

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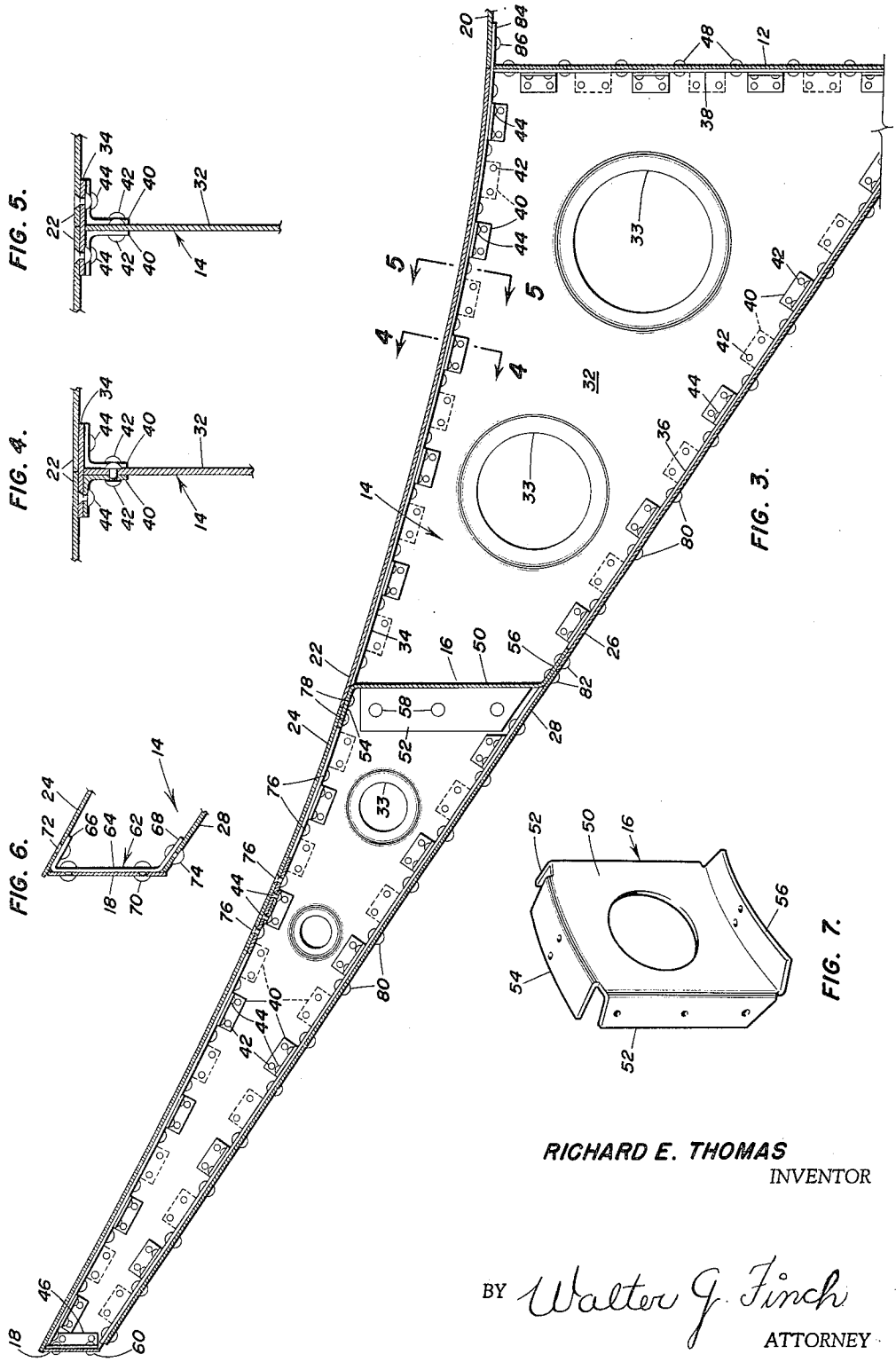

FIG. 3.

FIG. 5.

FIG. 4.

FIG. 6.

FIG. 7.

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THIN SKINNED PARABOLIC REFLECTOR WITH RADIAL RIBS

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2 Claims. (Cl. 343—912)

This invention relates generally to antenna structure, and more particularly it pertains to an improved reflector for electromagnetic radiation.

It is an object of this invention to provide a rigid light weight antenna reflector which is internally braced.

Another object of this invention is to provide an antenna disk having a continuous accurate reflecting surface suitable for frequencies high in the electromagnetic spectrum.

Yet another object of this invention is to provide an antenna reflector whose bracing structure is totally enclosed.

Still another object of this invention is to provide a thin skinned reflector surface for an antenna dish which obtains its contour and strength from spaced radial arms, spacers, and clips.

These and other objects and attendant advantages of this invention will become more readily apparent and understood from the following detailed specification and accompanying drawings in which:

FIG. 1 is a plan view, partly broken away, of an antenna reflector incorporating features of this invention;

FIG. 2 is a side elevation of the antenna reflector taken along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged view of a radial arm of the antenna reflector taken along line 3—3 of FIG. 1;

FIG. 4 is a cross section taken on the line 4—4 of FIG. 3;

FIG. 5 is a cross section taken on the line 5—5 of FIG. 3;

FIG. 6 is a cross section taken on the line 6—6 of FIG. 1; and

FIG. 7 is a perspective drawing of an intermediate spacer.

Referring now to the details of the drawings, and particularly FIGS. 1 and 2, the antenna reflector **10** of this invention includes a flanged cylindrical hub **12** from which a plurality of radially arranged arms **14** extend. Intermediate their ends, the radial arms **14** are held in equal distribution about a full circle by means of spacers **16**. The periphery of the reflector **10** is formed by spanning the ends of the radial arms **14** with closure sheets **18**.

A metal parabolic central disk **20** is secured over the aperture formed by the hub **12** and co-extensive with this disk **20**, the effective reflecting area further includes a plurality of abutting metallic parabolic gores **22** and **24**.

The under side of the antenna reflector **10** is covered with conical segmented sheets **26** and **28**, thus forming a completely enclosed, smooth, weather proof structure. A flanged tubular pedestal **30** is secured to the bottom of the hub **12** for handling purposes.

As shown in FIG. 3, each radial arm **14** is made up of a tapered web plate **32** having one edge accurately cut to a section of a parabolic curve. Flanged lightening holes **33** are provided in the web plate **32** to reduce weight and increase the stiffness of the plate **32**.

Upper and lower flange straps **34** and **36** are mounted on and conform to the edges of this plate **32** in the manner shown in detail in FIG. 4. For this purpose, spaced cleats **40**, staggered on opposite sides, are secured to the web plate **32** by means of rivets **42**.

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The flange straps **34** and **36** are fastened, in turn, to the cleats **40** by flush rivets **44**. An inboard flange strap **38** is fastened in similar fashion to the inner edge of web plate **32**. This flange strap **38** is used to mount each radial arm **14** to the hub **12** by means of rivets **48**.

The ends of the radial arms **14** are each provided with outboard cleats **46** to which closure sheets **18** are secured by means of rivets **60**.

The spacers **16** which distribute the radial arms **14** are pressed from a single piece of material so as to result in an arcuate wall **50** having opposing side flanges **52** and oppositely directed upper and lower flanges **54** and **56**. It is to be noted the upper and lower flanges **54** and **56** are curved and dished to conform to the desired reflecting top area and bottom surface, respectively, of the completed assembly of the reflector **10**.

The spacers **16** on opposite sides of the radial arms **14** are joined together with common rivets **58** which pass through the web plate **32**. Thus, the assembled spacers **16** form a segmented ring situated on the median circumference of the antenna reflector **10**.

Slanted U-shaped clips **62** are positioned intermediate the radial arms **14** as shown in FIG. 1 at the periphery of the antenna reflector **10**. Clips **62** are secured, as illustrated in FIG. 6, to the outer parabolic gores **24** and outer conical segment sheets **28** to preserve the curvature of the closure sheets **18** and the desired dishing of the gores **24**.

Each clip **62** is attached by its upper flange **66** to the respective gore **24** by means of flush rivets **72**. The lower flange **68** and web **64** of the clip **62** are secured to the segment sheet **28** and to closure sheet **18** by rivets **74** and **70**, respectively.

Flush skin rivets **76** are used to secure the gores **22** (and **24**) to the straps **34** in the manner shown in detail in FIG. 5. Additionally, flush rivets **78** are used to secure the abutting curved edges of the gores **22** and **24** to the flange **54** of each spacer **16**. Flush rivets **86** around the periphery of the central disk **20** attach the latter to overhanging inboard ends of straps **34**.

It is to be noted that this construction and use of flush type rivets results in a smooth continuous reflecting area for the antenna reflector **10** devoid of any projections which might have deleterious electrical effect.

Ordinary rivets **80** and **82** are suitable for use in securing the conical segment sheets **26** and **28** to the lower straps **36** and to the lower flanges **56** of the spacers **16**, respectively.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specially described.

What is claimed is:

1. An antenna reflector having a continuous accurate reflecting surface, comprising, holding means including a centering element having an axially arranged aperture therethrough, a plurality of radially arranged structural members extending outwardly from said centering element and each said structural member having its upper edge of parabolic shape, means radially spaced from said centering element for holding said radially arranged structural members in equal distribution about a full circle, means for spanning the peripheral ends of said radially arranged structure members, an electrically conductive parabolic central disk positioned over said aperture in said centering element, a plurality of electrically conductive abutting metallic parabolic gores arranged co-extensively with said central disk and supported adjacent the upper parabolic edges of said radially arranged structural

members to the peripheral ends of said radially arranged structural members for increasing the effective reflecting area of said reflector, segmented sheets covering the underside of said radially extending structural members so as to enclose said antenna reflector; with said parabolic gores and said segmented sheets having each of their edges correspondingly secured to the upper and lower edges of said structural members, holding means, and spanning means, and pedestal means for mounting said centering element.

2. The antenna reflector as recited in claim 1 where said holding means consists of a wall element positioned between each said structural members, with each said wall element having side flanges secured to their respective structural members and upper and lower flanges each conforming to the shape of said parabolic gores and said segmented sheets, respectively.

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