

March 5, 1968

A. A. BRACCINI

3,372,396

CANTILEVERED PETAL-BEAM PARABOLIC ANTENNA REFLECTOR

Filed Oct. 16, 1964

3 Sheets-Sheet 1

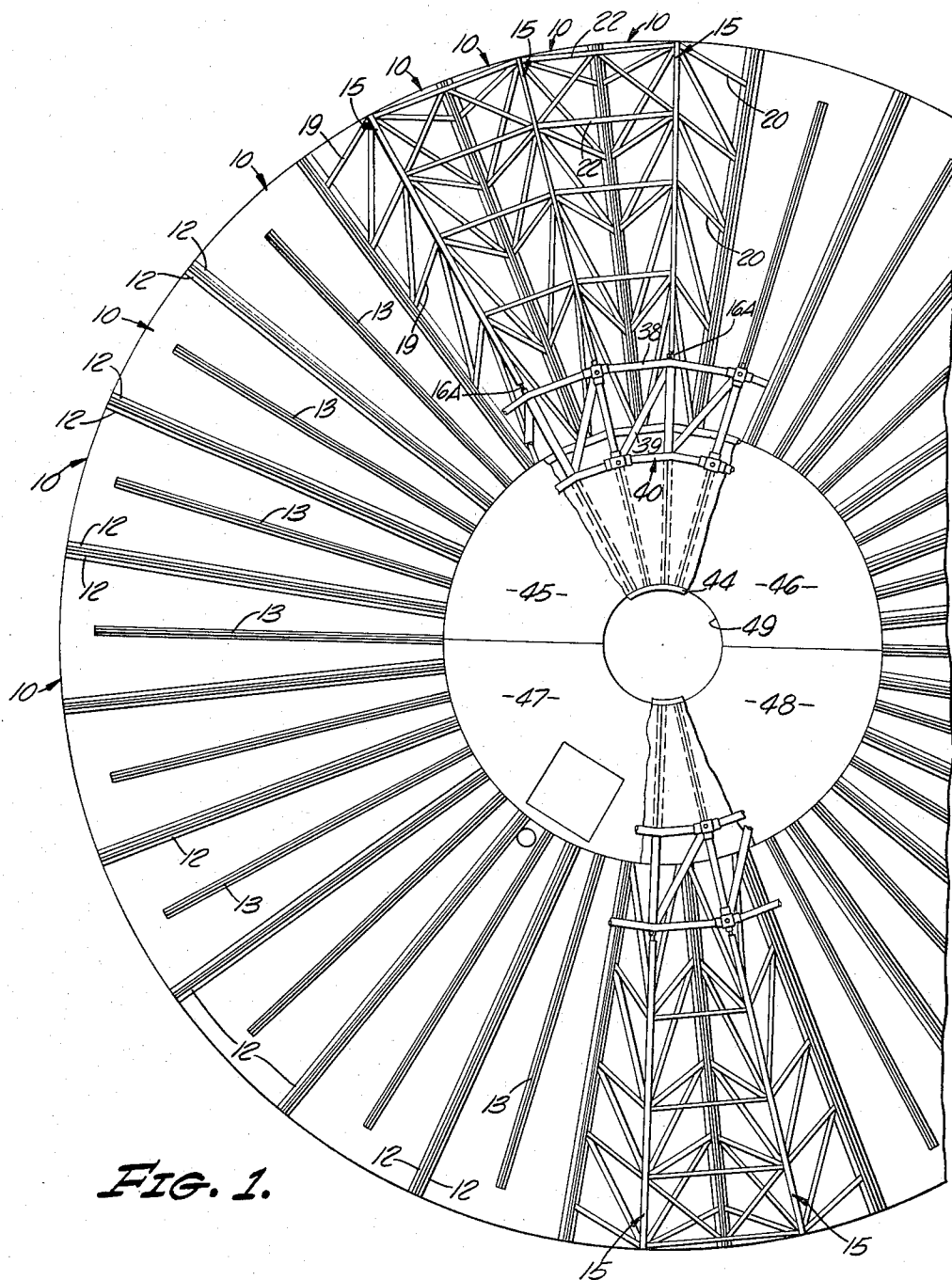


FIG. 1.

INVENTOR.
ALFONSO A. BRACCINI
BY *Lyon & Lyon*
ATTORNEYS

March 5, 1968

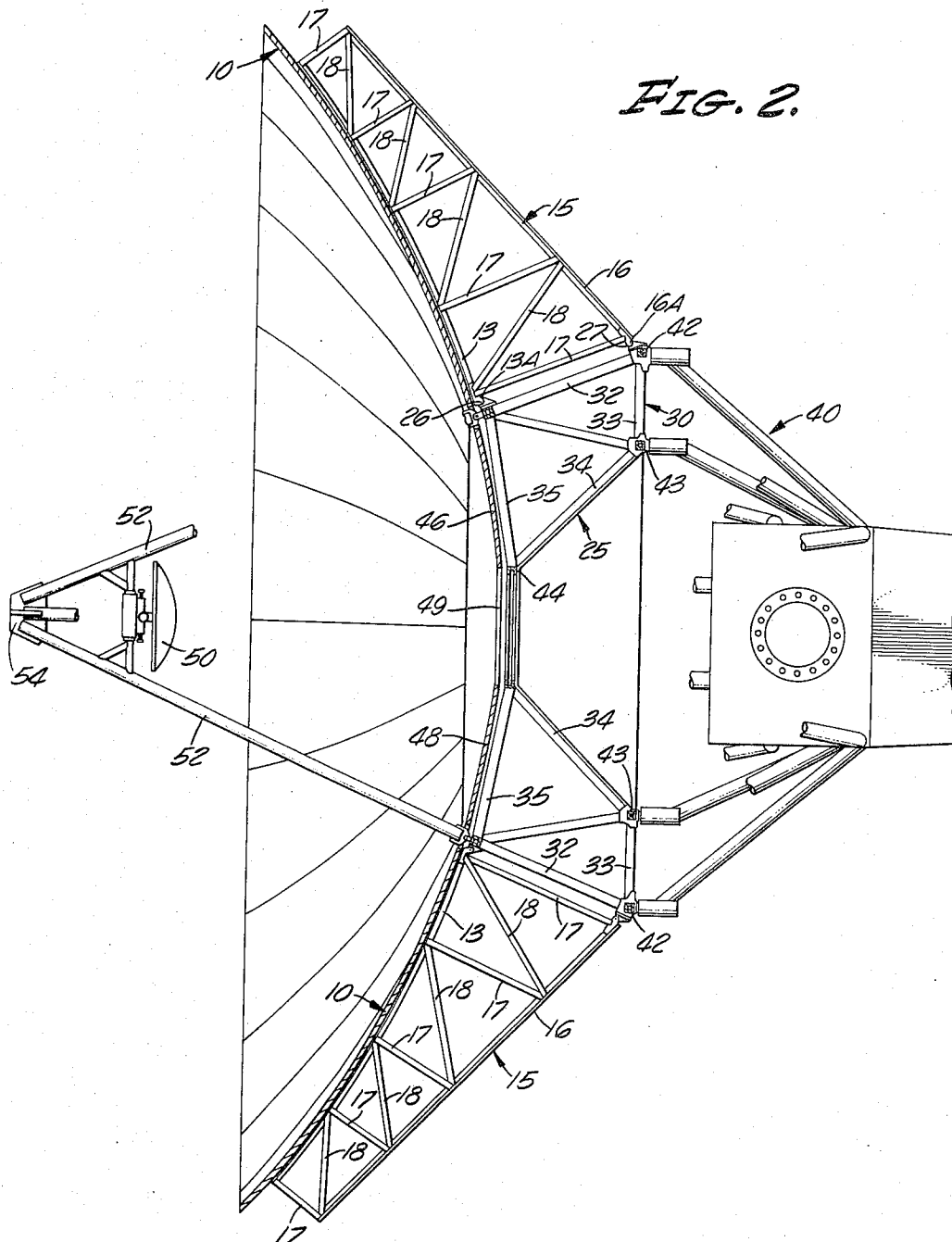
A. A. BRACCINI

3,372,396

CANTILEVERED PETAL-BEAM PARABOLIC ANTENNA REFLECTOR

Filed Oct. 16, 1964

3 Sheets-Sheet 2



INVENTOR.
ALFONSO A. BRACCINI
BY *Lyon & Lyon*
ATTORNEYS

March 5, 1968

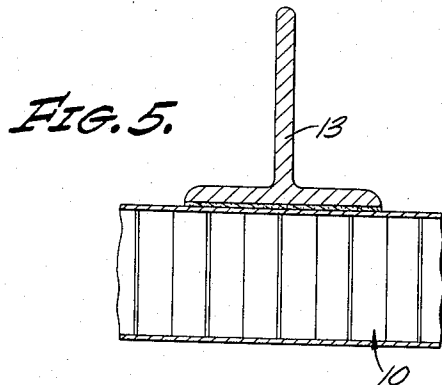
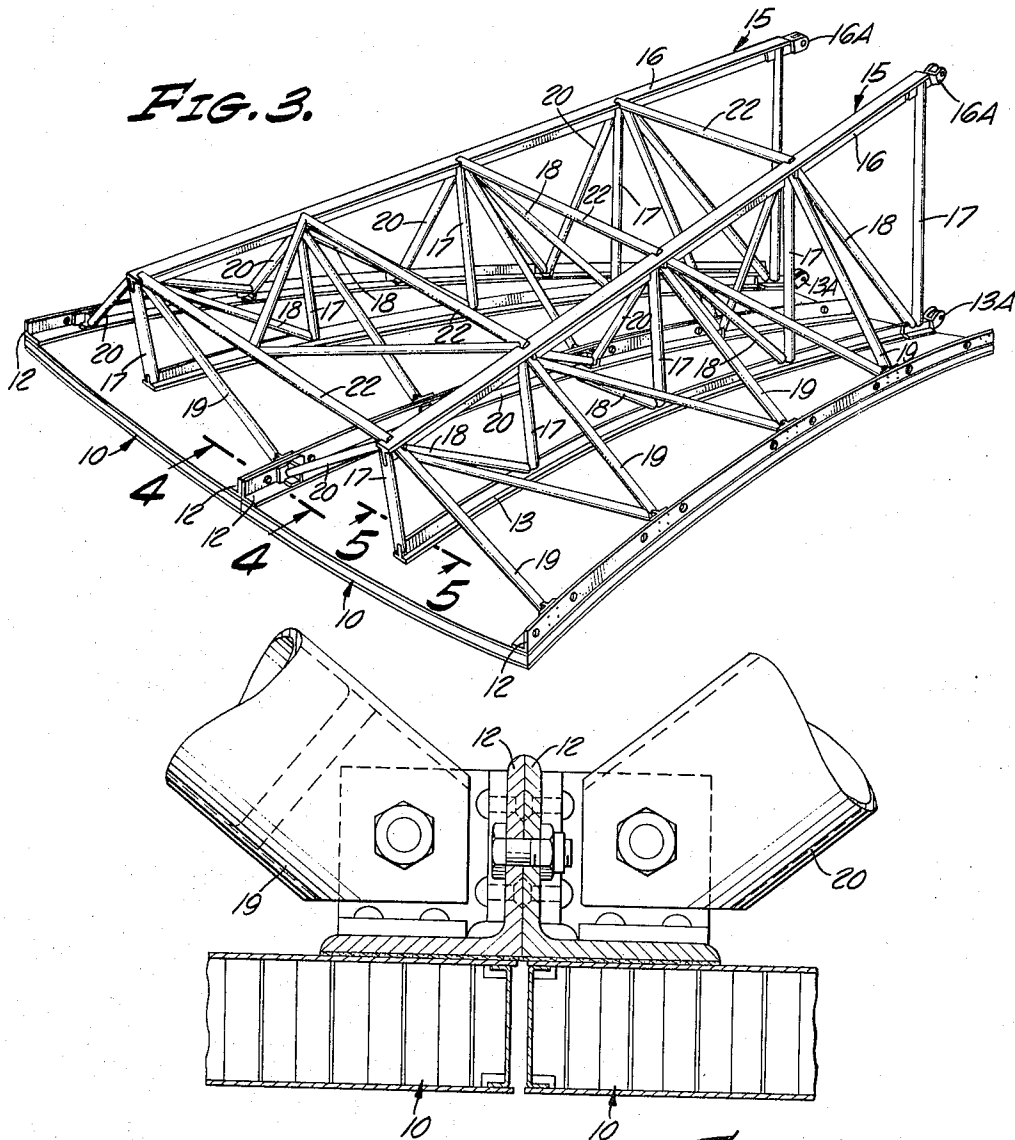
A. A. BRACCINI

3,372,396

CANTILEVERED PETAL-BEAM PARABOLIC ANTENNA REFLECTOR

Filed Oct. 16, 1964

3 Sheets-Sheet 3



INVENTOR.
ALFONSO A. BRACCINI
BY *Lyon & Lyon*
ATTORNEYS

1

3,372,396

CANTILEVERED PETAL-BEAM PARABOLIC ANTENNA REFLECTOR

Alfonso A. Braccini, La Mesa, Calif., assignor to
Whittaker Corporation, Los Angeles, Calif., a
corporation of California

Filed Oct. 16, 1964, Ser. No. 404,342

3 Claims. (Cl. 343-916)

ABSTRACT OF THE DISCLOSURE

A reflector for microwave energy consists of twenty-four cantilevered assemblies supported from a rigid torus. High structural efficiency is obtained by making the reflective panels and centrally disposed radial beams integral composite structures, with the reflective panels contributing bending stiffness to the radial beams. Additional stiffness is achieved by interconnecting the panels and by circumferentially connecting the radial beams to intercostal members which serve to stabilize and support the panel edges. The individual reflective panels are secured rigidly and permanently to the reflector's backup structure, the shape of the individual panels being accurately established at that time. At assembly, the individual panels are aligned with each other and a pair of fastening means on the ends of each centrally disposed radial beam is secured to spaced points on the torus.

The present invention relates to antenna constructions and in particular to the construction of the reflector therefore.

It is therefore a general object of the present invention to provide a reflector in accordance with and having the above indicated features.

A specific object of the present invention is to provide a reflector in which each individual panel thereof is accurately preshaped and then secured permanently to a back-up structure in such preshaped condition, with the panel and back-up structure both contributing to the strength of the composite reflector.

Another specific object of the present invention is to provide an arrangement whereby the individual panels may be quickly and accurately aligned with each other in assembly.

Another specific object of the present invention is to provide a reflector of this character involving a cantilever construction that is rigid yet of relatively light weight.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a view in elevation showing a portion of a reflector made in accordance with the present invention.

FIG. 2 is generally a longitudinal section through the same and shows a subreflector mounted thereon.

FIG. 3 is a perspective view illustrating the construction of individual sections and the manner in which they are interconnected.

FIGS. 4 and 5 are sectional views taken substantially as indicated by lines 4-4 and 5-5 in FIG. 3.

Referring to FIG. 3, the same shows two of the twenty-four reflective panels 10, each of which is approximately one inch thick and of conventional aluminum honeycomb sandwich construction.

The core, skin and L-shaped edge members 12, 12 and center T-shaped member 13 are bonded together under

2

elevated temperature and pressure during which time the desired shape is imparted to the individual panels. In imparting this desired shape, the honeycomb panels are drawn by a vacuum process against a heated forming mold, and during that time when the panels are in this condition, the metal back-up structure involving the elements 12, 12 and 13 are secured thereto by bonding and/or riveting.

The element 13 comprises a part of a center radial beam 15 having a radially extending element 16 which is generally straight and which is interconnected to element 13 by a series of elements 17 and 18. Intercostal elements 19, 20 and 22 interconnect the radial element 16 to elements 12, 12 on opposite sides thereof.

The individual panels 10 thus formed and braced are interconnected, as is also shown in FIG. 3, by abutting the surfaces of elements 12 of adjacent panels and securing them together by bolts, rivets or by welding after which or during which intercostal elements 22 are added to further secure elements 16 of different panels together.

The inner ends 13A, 16A of the elements 13 and 16, respectively, are fastening structures adapted for attachment to spaced points on the torus 25 using bolts or clevis pins 26 and 27, as indicated in FIG. 2, such spaced points lying on a line which is substantially perpendicular with the panel at its intersection with the panel. The torus 25 is annular and, as seen in FIG. 2, the same is generally trapezoidal in cross-section, with circumferentially spaced and joined trapezoidal frame sections 30 being defined by members 32, 33, 34 and 35. The individual sections 30, as seen in FIG. 1, are joined by intercostal elements 38, 39 and 40. The elements comprising the torus 25 are preferably welded square tubes.

The torus 25 is connected to the transition supporting structure 40 at twelve equally spaced circumferential stations 42, 43 at two diameters, using bolts or clevis pins to provide a total of twenty-four attachment points.

The torus extends inwardly to a three foot diameter ring 44 behind the apex of the reflector. This ring may be used to support a Cassegrainian feed, surface measurement devices or a platform for access to a sub-reflector which may be mounted as described later.

It will be seen that the outer portion of the reflector consists of 24 gore-shaped panels 10 that extend from approximately the twelve foot diameter to the rim. The center portion consists of four panel sections 45, 46, 47 and 48 defining when assembled a central apertured portion 49 aligned with ring 44, and these four panels are rigidly and permanently secured at their periphery to the back-up structure for panels 10.

A hyperbolic subreflector 50 may be supported near the focal point of the main parabolic reflector by a quadrupod arrangement of round tubing spars 52 which converge at a moment carrying joint 54.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. In a microwave reflector assembly of the character described, a reflector panel for reflecting microwave energy and for mounting on a torus; supporting elements secured along edges of said reflector panel for fastening to like elements on adjacent panels to effectively achieve a structural shell; a beam structure centrally mounted on and extending longitudinally of said panel; and intercostal elements interconnecting said beam structure to each of said supporting elements, said beam structure being of

3

increasing width in a direction extending from the outer end of said panel to its inner end where the inner ends of said beam structure terminate in a pair of spaced fastening structures for direct connection and fastening to two spaced points on said torus, said pair of fastening structures lying on a line which is substantially perpendicular to the panel surface at its intersection with said line.

2. An assembly as set forth in claim 1, in which said supporting elements are L-shaped each having an extended surface for abutment with and fastening to like elements on adjacent panels.

3. A reflector assembly as set forth in claim 1 including a pair of said panels with said beam and elements being mounted on each panel, and intercostal elements

4

interconnecting the beams of different ones of said pair of panels.

References Cited

UNITED STATES PATENTS

5	2,997,712	8/1921	Kennedy	-----	343—916
	3,010,106	11/1961	Lippitt et al.	-----	343—916 X

OTHER REFERENCES

10 Andrew Catalog D, Hubloc Antennas, effective date March 25, 1963.

HERMAN KARL SAALBACH, *Primary Examiner.*

P. L. GENSLER, *Assistant Examiner.*