

[54] **ANGULAR RF CONNECTOR**
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[58] Field of Search **174/75 C, 88 C, 89, 35.1, 35 C; 339/89 R, 176 R, 177 R, 177 E; 333/97 R**

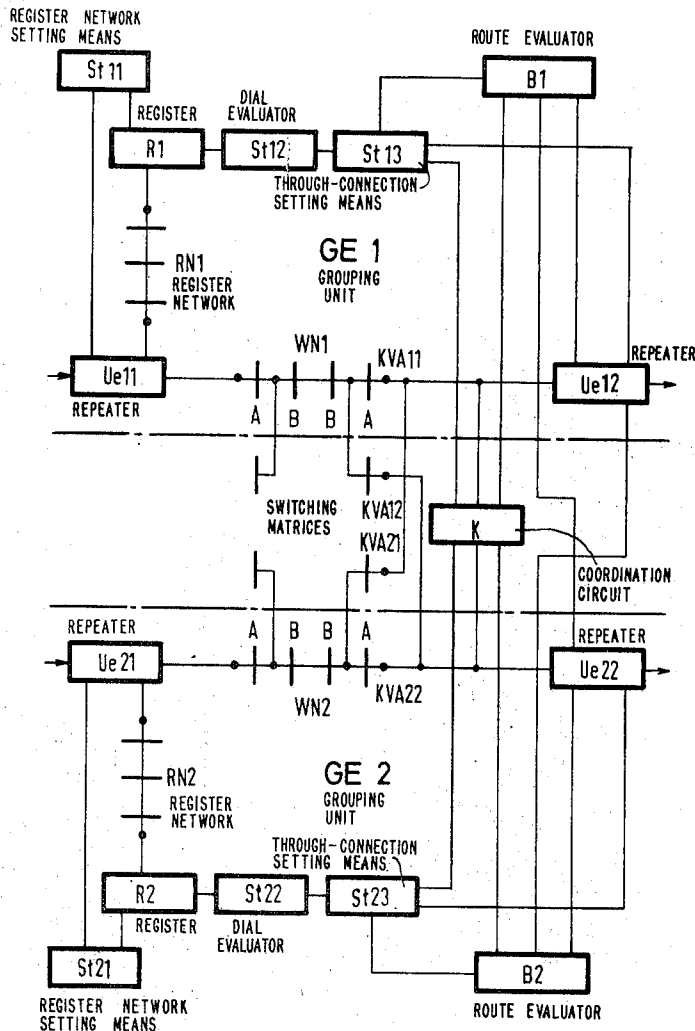
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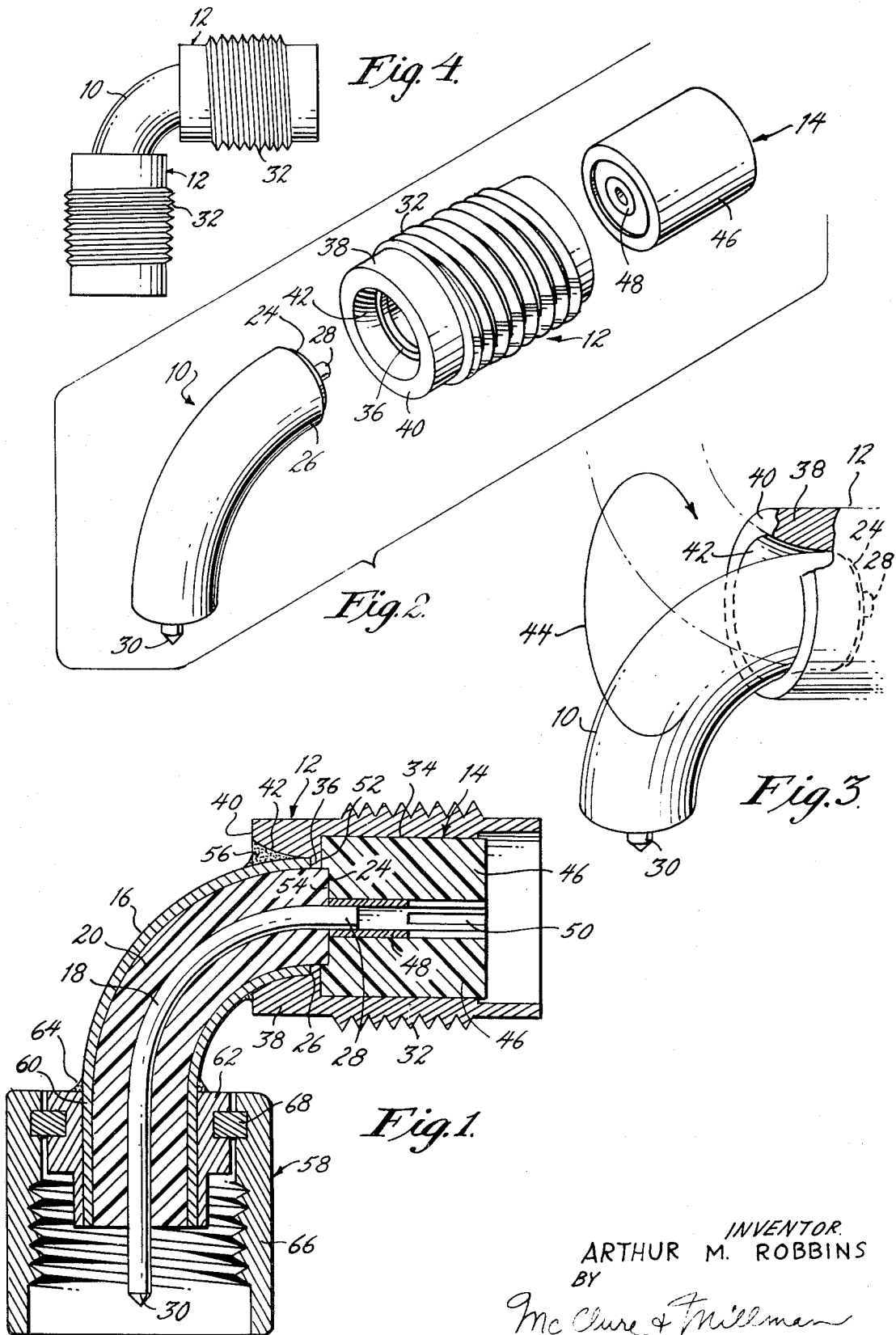
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[57] **ABSTRACT**
An angular RF connector comprised of an arcuate coaxial cable section and an adapter consisting of an outer conductor, inner tubular contact and a dielectric therebetween, one end of the outer conductor having a socket opening therethrough conforming to the surface generated by rotating the arcuate coaxial cable section around the axis of the adapter, the socket matingly receiving one end of the coaxial cable section and being conductively secured thereto.

[56] **References Cited**
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8 Claims, 4 Drawing Figures





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ANGULAR RF CONNECTOR

This invention relates to angular RF connectors for transporting RF energy from one component to another.

Heretofore angular connectors consisted essentially of a section of coaxial cable of arcuate shape which terminated in nonarcuate or straight end portions and separately formed adapters secured upon the straight end portions.

The primary object of this invention is to provide an RF connector in which one or both of the nonarcuate or straight end portions is eliminated and one or both of the adapters are secured upon the arcuate semirigid coaxial cable to mate therewith thus substantially lowering reflected energy losses as compared to angular connectors made of nonrounded or non-blended intersections and substantially reducing the overall length of the connector as compared to the conventional angular connectors made of rounded or blended intersections.

Another object of the invention is to provide an angular RF connector of the character described in which at least one of the adapters includes a socket in the outer conductor thereof which opens through one of its ends and which is formed to conform to a curve generated by rotating the arcuate coaxial cable about an axis through said adapter, the outer conductor of the arcuate coaxial cable mating with and in said socket and being connected thereto.

Yet another object of the invention is to provide an angular RF connector of the character described in which the coaxial cable is made of a unitary outer conductor, inner conductor and dielectric therebetween, and bent as an assembled unit to form the arcuate coaxial section for use in securing the adapter thereto in mating relation up to its point of tangency. These and other objects of the invention will become more apparent as the description proceeds in conjunction with the accompanying drawing, wherein:

FIG. 1 is a vertical sectional view through one form of angular RF connector of the invention;

FIG. 2 is a group perspective view of the arcuate coaxial cable and adapter to be mately affixed to one of its ends;

FIG. 3 is a diagrammatic view illustrating the formation of the mating socket in one end of the adapter through which the latter is affixed upon the arcuate coaxial cable; and

FIG. 4 is an elevational view of a modified form of the invention.

Specific reference is made to the drawing in which similar reference characters are used for corresponding elements throughout.

As seen in FIG. 2, the basic unit of the present angular RF connector comprises an arcuate section of coaxial cable 10 having no nonarcuate or straight end portions and an adapter consisting of an outer tubular conductor unit 12 and an inner unit 14 affixed therein.

The coaxial cable section consists essentially of an outer tubular ductile conductor or shield 16, made for example of copper, or aluminum having plating finishes for acceptability of solder, an inner solid center conductor 18, made for example of beryllium copper, and an insulating dielectric 20, such as Teflon, polyethylene, polyolefin, etc., in the outer tubular conductor receiving the center conductor and spacing the latter electrically from the outer conductor or shield 16. The dielectric 20 extends as at 24 beyond one edge 26 of the outer conductor or shield 16 whereas both ends 28 and 30 of the center conductor extend well beyond the respective ends of the outer conductor 16 and inner dielectric 20. The outer conductor or shield 16, inner conductor 18 and dielectric 20 are unitary and when assembled in straight pipe form are bent as such to form the arcuate section.

The adapter 12, 14 is functionally a female member, unit 12 being an open-ended tubular member having an externally threaded portion 32, an inner bore 34 terminating in an annular shoulder 36 and an end portion 38 from the shoulder 36 to the free end 40 of the tubular member 12. The end portion 38 includes a socket 42 opening through the free end 40 formed to conform to a surface generated by rotating the coaxial cable section 10 around the axis of the adapter 12, 14 as illustrated by the arrow 44 in FIG. 3.

The inner unit 14 of the adapter is a substantially cylindrical member comprising an outer dielectric 46 and an inner axially extending tubular metallic contact 48 having circumferentially spaced slots 50, preferably 90° apart. The inner unit 14 is secured in the outer conductor 12, as shown in FIG. 1, with the inner edge 52 thereof abutting one edge of the shoulder 36, the dielectric 46 and end of contact 48 being centrally recessed to form a face 54 to receive the jutting end 24 of the coaxial cable dielectric 20.

The adapter 12, 14 is positioned on the arcuate end of the coaxial cable 10 so that that end extends through the mating socket 42 until the free edge 26 of the shield 16 abuts the shoulder 36 of the outer conductor unit 12 of the adapter, the free jutting end 24 of the coaxial cable dielectric 20 abuts the recessed face 54 of the adapter with the exposed end 28 of the central conductor 18 of the coaxial cable extending and joined into the contact 48 of the adapter. A solder fillet 56 is then provided in the mating socket 42 to connect the end of the coaxial cable with the adapter. The arrangement is such that the adapter is connected to the coaxial cable up to the point of tangency. Instead of a solder fillet, metallized adhesive or equivalent securing means may be employed.

The adapter 12 being a female adapter is designed to be secured in an internally threaded male adapter such as member 58, FIG. 1, which is affixed upon another length of coaxial cable that includes a center conductor which extends into the contact 48. When two female adapters 12 are affixed upon an arcuate length of coaxial cable a connector such as that shown in FIG. 4 is obtained.

In most applications, the angular RF connector will be provided at its opposite ends with a female adapter 12 and a male adapter 58, in which case the arcuate coaxial cable section 10 will be provided with a straight or tangential portion 60 upon which the male adapter 58 is secured. The male adapter 58 comprises a metallic collar 62 which is soldered or secured by metallized adhesive or the like as at 64 to the outer conductor or shield 16 at the straight portion 60. An internally threaded collar 66 is rotatably mounted on the fixed collar 62 by a suitable ring 68 retained in cooperating grooves in the collars.

Thus the present invention is a semirigid miniature coaxial cable connector which is shorter than the conventional coaxial connectors and provides low-loss, total shielding, eliminates radiation leakage, imparts low attenuation and offers environmental stability.

While preferred embodiments have been here shown and described, it will be understood that other variations may be made without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. An angular RF connector comprising an arcuate section of coaxial cable having an outer shield, inner conductor and dielectric therebetween, the ends of said inner conductor extending beyond the ends of said outer shield and dielectric, at least one end of said arcuate section containing no straight or tangential portion, and an adapter including an outer tubular conductor, an inner tubular contact and a dielectric therebetween, one end of said outer conductor of said adapter including a socket conforming to a surface generated by rotating said one end of said arcuate coaxial cable section around the axis of said adapter, said one end of said arcuate coaxial section matingly extending into said socket, said outer shield of said coaxial cable being conductively affixed to the outer conductor of said adapter and said inner conductor of said coaxial cable being engaged in said tubular contact of said adapter.

2. The connector of claim 1 wherein said outer tubular conductor of said adapter is externally threaded for coupling to internally threaded members.

3. The connector of claim 1 wherein another adapter is affixed to the other end of said arcuate coaxial cable section.

4. The connector of claim 1 and an internally threaded member conductively affixed to the other end of said coaxial cable section.

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5. The connector of claim 1 wherein said one end of said adapter containing said socket extends axially beyond said dielectric of said adapter and is spaced therefrom by a shoulder which abuts the free end of said coaxial cable which extends into said socket.

6. The connector of claim 5 wherein the end of said dielectric of said coaxial cable section extends beyond said shoulder into a recess in and abuts said dielectric of said adapter.

7. An angular RF connector comprising an arcuate section of coaxial cable having an outer shield, inner conductor and dielectric therebetween, at least one end of said arcuate section containing no straight or tangential portion, the free end of said dielectric at said one end of the coaxial cable extending beyond the corresponding free end of said outer shield, the free end of the inner conductor at said one end of the coaxial cable extending beyond said dielectric, and an adapter including an outer tubular conductor one end of which includes a socket conforming to a surface generated by rotating said one

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end of said arcuate coaxial cable section around the axis of said adapter, said outer conductor of said adapter including an inner bore and an inner annular shoulder separating said socket and inner bore, a dielectric in said bore abutting one side of said shoulder, an inner tubular contact in said dielectric, said one end of said coaxial cable extending into said socket until the free end of said outer shield abuts the other side of said shoulder, at which point said adapter extends up to the point of tangency of said coaxial cable, said free end of said inner conductor being engaged in said tubular contact of said adapter and said outer shield of said coaxial cable being conductively affixed to said outer conductor of said adapter.

8. The connector of claim 7 wherein said dielectric of said adapter includes a recess in the face thereof adjacent said shoulder and receiving the free end of said dielectric of said coaxial cable.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,636,239 Dated January 18, 1972

Inventor(s) Arthur M. Robbins

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet, cancel the illustrative drawing and insert the drawing on the attached sheet:

Signed and sealed this 17th day of October 1972..

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

