Feb. 12, 1957 D. G. ARMSTRONG 2,781,500

TERMINAL SUPPORT FOR BAYONET TYPE COAXIAL CONNECTOR

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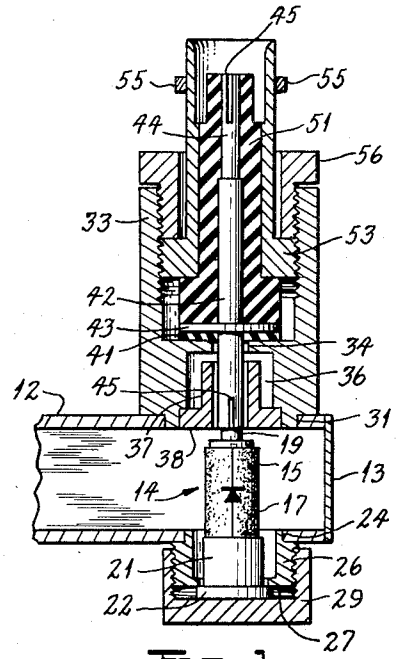


Fig. 1

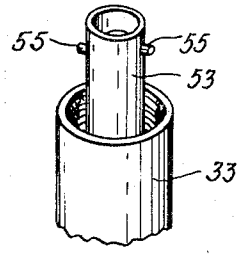


Fig. 3

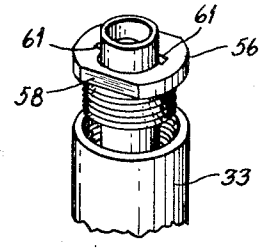


Fig. 4

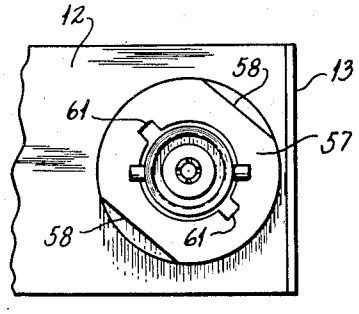


Fig. 2

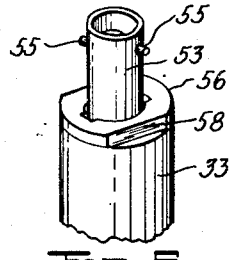


Fig. 5

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TERMINAL SUPPORT FOR BAYONET TYPE COAXIAL CONNECTOR

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2 Claims. (Cl. 339—177)

This invention relates to a crystal detector assembly and more particularly to a crystal detector assembly which is adapted to be used at the terminal of a waveguide.

In the prior art the crystal detector assembly was connected to an output circuit through a type N or Amphenol output connector. The type N connector has an effective usefulness up to 10,000 megacycles. However it is somewhat cumbersome to use. Where the operational frequency does not extend beyond the 4,000 megacycle range of the type BNC connector has been found to have several advantages over the type N connector. The type BNC connector is of considerably smaller size than the type N connector for which it may be substituted. In addition, it takes much less time to assemble the type BNC connector. Also, because of its included locking feature, the elements of the type BNC connector are readily retained in properly assembled relationship.

Type N and type BNC connectors are coaxial connectors; the former is a screw type connector and the latter is a bayonet twist lock connector.

Information on the types N and BNC connectors may be found in the publication "Armed Services Index of R. F. Transmission Lines and Fittings," ASESA 49–2B (Navships 900–102B), Nov. 1, 1952, issued by the Armed Services Electro Standards Agency.

This invention marks a departure from the prior art by providing a crystal detector assembly for a waveguide which is adapted to be used with a type BNC connector. The invention includes a coaxial crystal mounting arrangement for cartridge type crystals which includes a central conductor and a concentric outer conductor separated from the inner conductor by a suitable insulator with both conductors being held in assembled relationship by means of a properly designed nut for threaded engagement with a threaded support member and wherein the nut serves the additional purpose of aiding in assembly.

An object of this invention is to provide an improved crystal mount assembly.

A A further object is to provide an improved crystal mount assembly which is adapted to be used with a type BNC connector.

A further object is to provide a crystal mount assembly which includes means for receiving a type BNC connector without sacrificing any useful features known to the prior art.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a side view of the crystal mount with the waveguide and parts of the crystal detector assembly shown in section,

Fig. 2 is a plan view of the device shown in Fig. 1, and

Figs. 3–5 are perspective views of the crystal mount in various stages of assembly.

The embodiment of the invention shown in the drawing is directed to the use of a cartridge type crystal as a microwave detector, the crystal being physically mounted in a rectangular waveguide for coupling the waveguide to a coaxial cable. In Fig. 1 there is shown a waveguide **12** terminating in an end plate **13**. A cartridge type crystal detector unit **14** of the type known as JAN 1N27 comprising a tubular portion **15** of insulating material housing the crystal which is shown diagrammatically at **17** is mounted in the waveguide. One end of the cartridge type crystal **14** is terminated in a flanged tip terminal **19**. The other end is closed by a sleeve-like member **21** of conducting material which terminates in a radial flange **22**.

The cartridge type crystal **14** is mounted centrally of the wide sides of the waveguide and at a distance approximately equal to a quarter wave length at the operating frequency from the end plate **13**. The bottom side of the waveguide **12** is provided with a bore **24** wherein there is secured by suitable means the reduced axial portion of a cylindrical stub-like member **26**. The cylindrical stub-like member **26** is threaded along its entire outside surface and is provided with a radially inwardly projecting lip **27**. An inside threaded cap **29** for threaded engagement with member **26** is adapted to clamp the radial projecting flange **22** of the crystal cartridge **14** between the inside end surface of the cap **29** and the outer surface of the lip **27**. By this arrangement it is a relatively easy matter to replace the crystal by simply removing the cap **29** and withdrawing the crystal by manually gripping the radial flange **22**.

The annular space between the stub-like member **26** and the sleeve portion **21** of the crystal **14** is designed to facilitate impedance matching in the waveguide in a manner well known in the art. The foregoing description has been directed to structural details which are not novel and do not constitute the invented features of this disclosure.

The upper one of the wide sides of the waveguide **12** as seen in Fig. 1 is provided with a bore **31** which is in axial alignment with the bore **24**. A cylindrical support member **33** which is considerably longer than and of greater diameter than the cylindrical stub-like member **26** but which is reduced at one end thereof in the same manner as the member **26** is mounted in the bore **31** of the waveguide **12**. The cylindrical support member **33** intermediate its ends has a short section **34** of reduced inside diameter which serves as a mounting abutment. Intermediate this short section **34** of reduced diameter and the end of member **33** opposite that which is mounted in the waveguide section **12** is an internally threaded portion. Between the reduced diameter section and the end of the cylindrical member **33** mounted in the waveguide **12** is a stepped passage **36**. Mounted in said stepped passage **36** is a flanged sleeve **37**. The flange **38** of the sleeve **37** is of such thickness so as to seat in the portion of the passage **36** extending to the step. After assembly of the foregoing the inside surface of the waveguide **12** remains flush.

An insulating washer **41** is provided adjacent the section **34** of reduced diameter. Extending through the central opening of the washer **41** is a central cylindrical conductor **42**. The central cylindrical conductor **42** may be machined from solid bar stock so as to provide a flange **43** and a reduced end portion **44**. Each of the ends of the cylindrical conductor **42** is bored and slotted as at **45** and **46** so as to provide spring finger sockets.

An elongated insulating member **51** slips over the end **45** of the central cylindrical conductor **42** so as to completely isolate the conductor **42** from the concentric mounting members. An adaptor **53** having a threaded

radial flange 54 is adapted to slip over the insulator 51 and threadedly engage the inside surface of the cylindrical member 33. The end of the adaptor 53 opposite to the flange portion 54 is provided with a pair of diametrically opposite external pins 55. The inside surface of the adaptor 53 at this same end is reduced and tapered. The inside end portion of the adaptor 53 with the insulator 51 forms an annular opening which extends axially substantially the same distance as does the slotted end 45 of the center conductor 42. A locknut 56 is provided having a flange 57 which flange is reduced at two diametrically opposite portions of the periphery to provide a pair of parallel flat sections 58 so that an ordinary open end wrench may be used to tighten down the nut against the adaptor 53. The inside of locknut 56 is provided with two longitudinally extending slots 61 by means of which the locknut may be slipped over the pins 55 on the adaptor 53.

The assembled crystal mount as shown and described is adapted to receive a BNC connector. The use of BNC connectors in many applications is currently becoming increasingly common. Since the output of a crystal mixer or detector contains no high frequency component, BNC connectors are as satisfactory as the larger and more awkward type N connectors for this purpose.

Figs. 3, 4, and 5 show the nut 56 in progressive stages of assembly. The nut 56 is slipped over the pins 55 and sliding down between the adaptor 53 and the cylindrical member 33 threadably engages the inside surface of the cylindrical member 33. A wrench (not shown) may be used for the final turn of the nut 56.

The annular opening that remains in the stepped passage 36 after assembly is designed to minimize leakage in a manner that is conventional and well known in the art. Furthermore though not clearly shown in the drawing, the proper ratio of diameters between the concentric conductors will give proper impedance match and minimum loss. No discussion of this is made since it is likewise known to the art.

In operation, the waveguide is provided adjacent its ends with two coaxial bores through its opposite wide sides. Oppositely mounted in said bores are a cylindrical member 33 and a cylindrical member 26. The center conductor 42 with the insulating washer 41 slipped over its lower end is inserted through the reduced section 34. The insulator 51 is slipped over the center conductor 42 following which the adaptor 53 is threaded into the cylindrical member 33 until it abuts the flange of the insulator 51 finger tight. Subsequently and as shown in Figs. 3, 4, and 5 the locknut 56 is slipped over the end of the adaptor and with the slots of the locknut in registration with the pins 55, the nut is turned so as to further tighten the adaptor in place. The locknut is then lowered into the support member 33 and manually threaded into it. The final tightening operation of the nut may be performed by means of a wrench.

The crystal mount described is similar to conventional crystal mounts having type N or Amphenol output connectors. The outer conductor section referred to as the

adaptor in the specification and the center conductor may be designed to meet standard specifications for a female BNC connector. The two pins 55 on the adaptor are so located as to fit into a pair of spiral slots in the mating BNC cable connector.

Obviously many modifications and variations of the present invention are possible in the 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 specifically described.

I claim:

1. An improved terminal device adapted to be used with a bayonet type coaxial connector, said terminal device comprising; a support member formed with an axial opening threaded adjacent one end and formed with an inside flange intermediate the ends of the opening; an insulator washer on the flange; a center conductor formed with a flange intermediate its ends for abutting said insulator washer; a tubular insulator formed with a flange at one end for butting up against the flange of said center conductor; a tubular adaptor formed at one end with a threaded flange and toward its other end with a pair of opposed pin-like projections on its outer surface, the pin-like projections adapted to register with a pair of spiral slots in a mating male bayonet type coaxial cable connector; and an externally threaded locknut formed at one end with an external tightening flange with opposed flats and formed internally with opposed longitudinal slots for registration with the pin-like projections on said tubular adaptor.

2. Improvements in a terminal device, adapted to be used with a bayonet type coaxial connector, wherein the terminal device includes a support member formed with an axial opening and an inside flange intermediate the ends of the opening, an insulator washer on the flange, a center conductor formed with a flange intermediate its ends for abutting the insulator washer, a tubular insulator formed with a flange at one end for butting up against the flange of the center conductor; said improvements comprising a tubular adaptor formed at one end with a threaded flange and toward its other end with a pair of pin-like projections on its outer surface, the pin-like projections adapted to register with a pair of spiral slots in a mating male bayonet type coaxial connector, and an externally threaded locknut formed at one end with an external tightening flange with opposed flats and formed internally with opposed longitudinal slots for registration with the pin-like projections on said tubular adaptor.

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