3,369,198 WATER COOLED WAVEGUIDE LOAD
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1 Claim. (Cl. 333—22)

This invention relates to waveguides that are water cooled to reduce the temperature thereof and to increase the power handling capabilities thereof.

High power microwave waveguide loads are normally air cooled, with or without fins, or water cooled by an external water jacket or water filled glass tubes inside the waveguide. The existing air cooled waveguides are fairly simple and light in construction, but power handling capabilities are very limited. The above noted water cooled waveguides are heavy and complex in construction and are thus not completely satisfactory. Therefore, a simple and light weight water cooled waveguide is greatly needed.

With this need in mind, it is an object of this invention to provide a simple and light weight water cooled waveguide.

Another object of this invention is to provide a water cooling arrangement that can be added to existing air cooled waveguides.

A further object of this invention is to provide a water cooled waveguide that is rugged in construction yet very low in cost.

Still another object of this invention is to conduct heat away from the waveguide in the circulated water rather than heating the ambient air.

In accordance with this invention, a water cooled waveguide load is provided in which copper or aluminum tubing is wound about the outer periphery of the waveguide and secured to the waveguide such as by soldering to the outer surfaces of the waveguide. Water can then be circulated through the tubing to conduct heat away from the waveguide.

In the accompanying drawing forming a part of this specification, and in which like numerals are employed to designate corresponding parts throughout the same:

FIGURE 1 is a side view of a conventional air cooled waveguide load;
FIGURE 2 is a side view of a waveguide load with water cooling means according to applicants' invention;
FIGURE 3 is an end view along line 3—3 of FIGURE 2; and
FIGURE 4 is bottom view along line 4—4 of FIGURE 2.

Referring now to FIGURE 1, a conventional air cooled waveguide load 1 includes an aluminum body 2 therein and a conventional connecting flange 3. To waveguide load 1, a copper or aluminum tube 5 (see FIGURES 2—4) is wound about bottom surface 7, end surface 9, and top surface 11 to provide two U-shaped portions 13 and 15 that are interconnected by intermediate portion 17 and provided with supply and exhaust connections 19, 21. Supply connection 19 has flare fitting 23 for connection to a water supply, and flare fitting 25 provides means for connecting exhausting circulated water. Copper or aluminum tube 5 is securely mounted to surfaces 7, 9 and 11 such as by solder 27.

By providing tube 5 about the waveguide load as illustrated and described, the output capabilities are multiplied while the temperature of the waveguide load is maintained at a minimum for appropriate power ratings for the waveguide load.

It is to be understood that the form of our invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the size, shape and arrangement of parts may be resorted to, without departing from the spirit of our invention, or the scope of the subjoined claim.

We claim:

1. A water cooled waveguide including: a waveguide body with tubing wound about three outer surfaces, two of which are flat and opposite each other and the other of which is an end surface which intersects said two surfaces, said tubing being wound about said surfaces in the form of two U-shaped portions with each U-shaped portion defining a base and two legs and an intermediate tube portion interconnecting a leg of each of the U-shaped portions; means permanently securing said tubing to said outer surfaces for heat exchange relationship; and means at opposite ends of the tubing for connecting one end of the tubing to a water supply and for connecting the other end of the tubing to means for receiving exhaust water.

References Cited

UNITED STATES PATENTS
2,079,137 5/1937 Varian --------------- 313—22
2,648,047 8/1953 Hollingsworth -------------- 333—22
2,669,696 2/1954 Ward ---------------- 333—22
2,752,572 6/1956 Bird et al. -------------- 333—22
2,908,875 10/1959 Blatt et al. ------------ 333—22
3,030,592 5/1962 Lamb et al. ------------ 333—22
3,147,451 9/1964 Merdinant -------------- 333—22
3,280,360 10/1966 Frost et al. ------------- 315—12
3,312,914 4/1967 Bolster -------------------- 333—22

FOREIGN PATENTS
1,079,224 4/1960 Germany.

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